MONTGOMERY COUNTY, MARYLAND

TEN-YEAR COMPREHENSIVE WATER SUPPLY AND SEWERAGE SYSTEMS PLAN

CHAPTER 3: WATER SUPPLY SYSTEMS

APPROVED 2003 - 2012 PLAN

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CHAPTER 3: WATER SUPPLY SYSTEMS

I. INTRODUCTION

This chapter addresses the County's water supply, demand, treatment, and distribution issues. It discusses the major water supply facilities that have been approved by various federal, state, and local agencies in recent years to provide for the mid- and long-range water supply needs of the County and the Washington Metropolitan Region. As part of this discussion, this chapter provides information which addresses water consumption, water system transmission, storage facilities, planning, and financing issues, and projected water treatment and area distribution systems needs.

This Plan recognizes the importance of protecting the quality of water supply resources to increase water supply resources and minimize treatment costs. Current sources of drinking water supply and the capacity to store, treat, and distribute it are limited. Therefore, at some point in time, new raw water sources and/or changes in current use patterns may be necessary to provide adequate service to increasing regional populations. The maintenance and improvement of surface water quality serves.

A. Water Service Area Categories -- As discussed in Chapter 1, this Plan classifies all areas of the county into one of five category designations for water service areas. The categories range from areas currently served by community systems (W-1), to areas where improvements to or construction of new community systems will be planned in the future (W-3, W-4, and W-5), to areas where there is no planned community service (W-6). Note that in practice, Montgomery County does not use category W-2, which the State uses to designate areas where community water system projects are in the final planning stages. Figure 3-F1 shows a generalized distribution of water service area categories throughout the county. For additional detailed information on water service categories, please refer to Chapter 1.

B. Sanitary Districts -- The county is divided into three publically-operated and largely separate sanitary service areas or districts. These districts are: the Washington Suburban Sanitary District (WSSD), the largest system, serving most of the county; and two smaller municipal districts, one owned and operated by the City of Rockville and the other by the Town of Poolesville. (See Figure 3-F2.) Each district has its own water supply sources, treatment facilities, and distribution systems. Information for the districts serving Rockville and Poolesville was provided primarily by those municipalities and incorporated into this Plan consistent with State law.

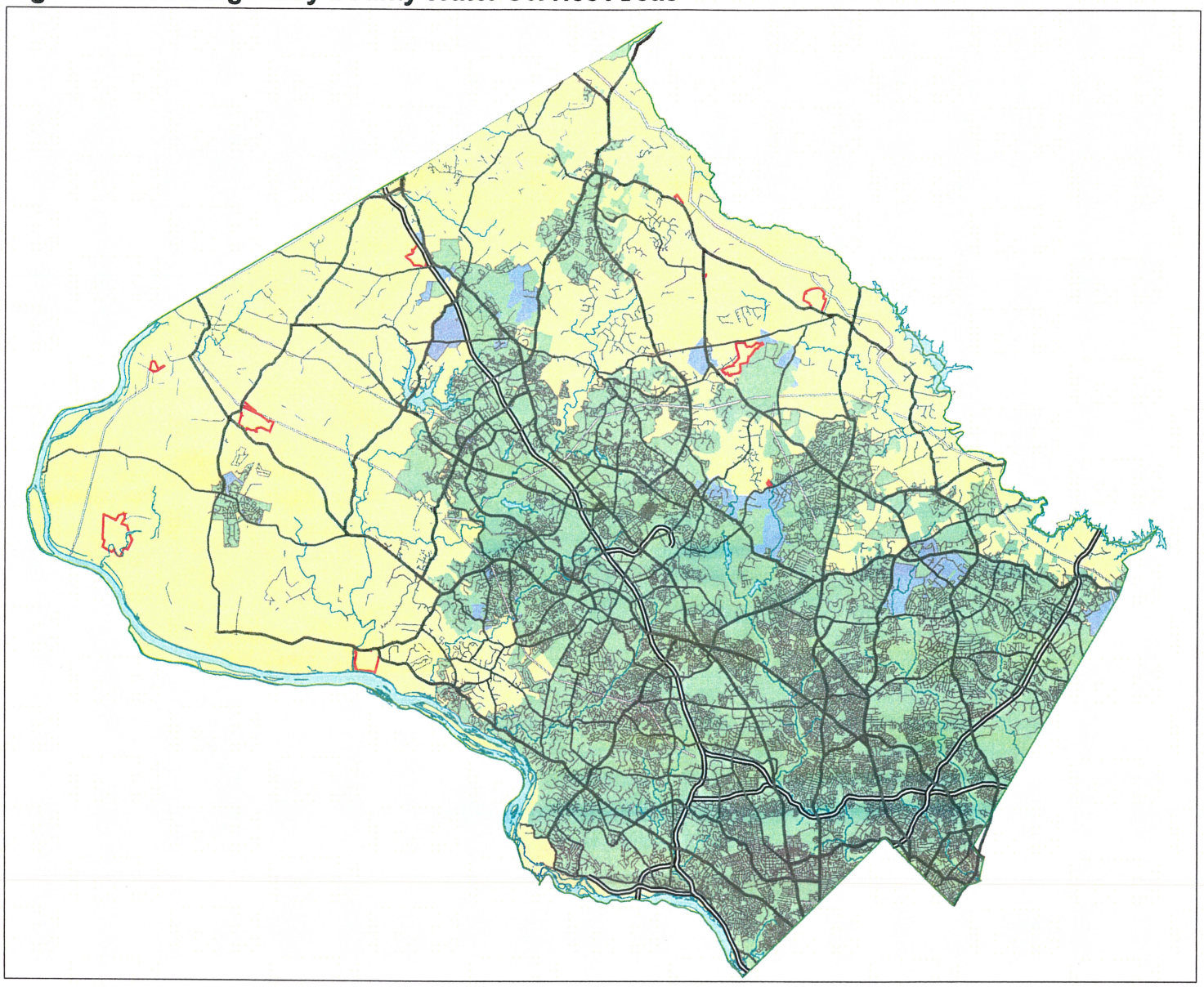
This chapter addresses each of these districts independently, starting with the WSSD, with a primary focus on community water systems and service. Within each sanitary district, some properties are served by individual, on-site systems, rather than community systems. The vast majority of these individual systems are within the WSSD. Information on individual, on-site systems, or rural sanitation service, follows at the end of the chapter.

II. WASHINGTON SUBURBAN SANITARY DISTRICT

The WSSD, established by State law, includes most of Montgomery and Prince George's Counties, and encompasses a total area of approximately 1000 square miles. Guided by the policies included in this Plan, the provision of community water service within Montgomery County generally follows the patterns established by the County's General Plan for development, "On Wedges and Corridors." Community service is established and planned for the central and southern part of the county, following three major transportation corridors of higher density development north from the District of Columbia:

- The U.S. Route 29 (Colesville Road/Columbia Pike) corridor to Burtonsville,
- The Georgia Avenue (State Route 97) corridor to Olney. and
- The U.S. Interstate 270/State Route 27 (Ridge Road) corridor to Clarksburg and Damascus.

Figure 3-F1: Montgomery County Water Service Areas



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MAP LEGEND
Major Roads
County Roads
State Roads and Highways
US & Interstate Highways
Major Streams - Rivers - Lakes - Reservoirs
General Water Service Areas
Approved Community Water Service Areas (W-1 & W-3)
Proposed Community Water Service Areas (W-4 & W-5)
Private, On-Site Water Service Areas (W-6)
Approved for Multi-Use Water Supply Systems (W-6)

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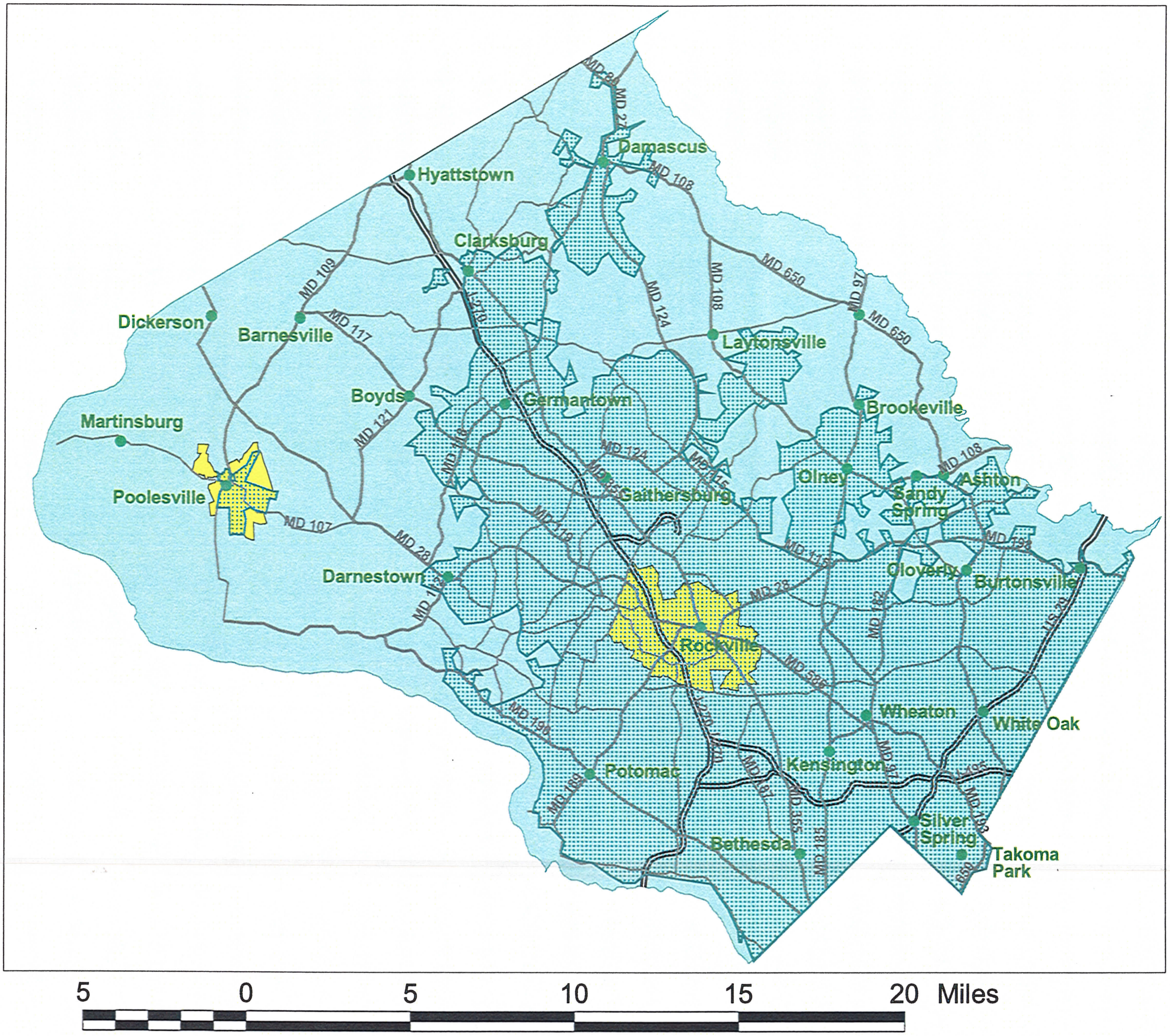
Figure 3-F2: Sanitary Districts Within Montgomery County



MAP LEGEND

- Localities

Major Roads

- County Roads
- State Roads and Highways
- US and Interstate Highways
- Existing/Approved Community Water Service Areas
- Municipal Sanitary Districts
- Washington Suburban Sanitary District

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Montgomery County Maryland

Watershed Management Division
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County water service policies also allow for some limited provision of community service to lower-density areas adjacent to and between these major corridors. Community service in the WSSD depends on surface water supply from two major rivers: the Potomac River and the Patuxent River. Elsewhere, primarily in the western and northeastern parts of the county, water service depends on individual, on-site systems, which receive their water from groundwater.

By an agreement with WSSC, Frederick County supplies community water service to the Rattlewood Golf Course, operated by the Montgomery County Revenue Authority. The golf course is located at the northernmost tip of the county,in the WSSD, approximately 4-1/2 miles north of downtown Damascus. The community water supply is provided by three groundwater wells in Frederick County's Mill Bottom water supply system; all three wells are located in Frederick County.

A. Government Responsibilities -- The responsibilities for planning for and providing water service within the WSSD are multi-jurisdictional and depend on the cooperative efforts of municipal, County, State, Federal, and regional authorities. This is especially true with regard to the Potomac River, a shared raw water source for several jurisdictions. These agencies include the following:

- Montgomery County Government
  - Department of Environmental Protection (DEP)
  - Department of Permitting Services (DPS)
- Washington Suburban Sanitary Commission (WSSC)
- Maryland - National Capital park and Planning Commission (M-NCPPC)
- Interstate Commission on the Potomac River Basin (ICPRB)
- Metropolitan Washington Council of Governments (COG)
- State of Maryland
  - Department of the Environment (MDE)
  - Department of Planning (MDP)

These agencies, and their primary responsibilities and programs, are described in detail in Chapter 1, Section I.D.

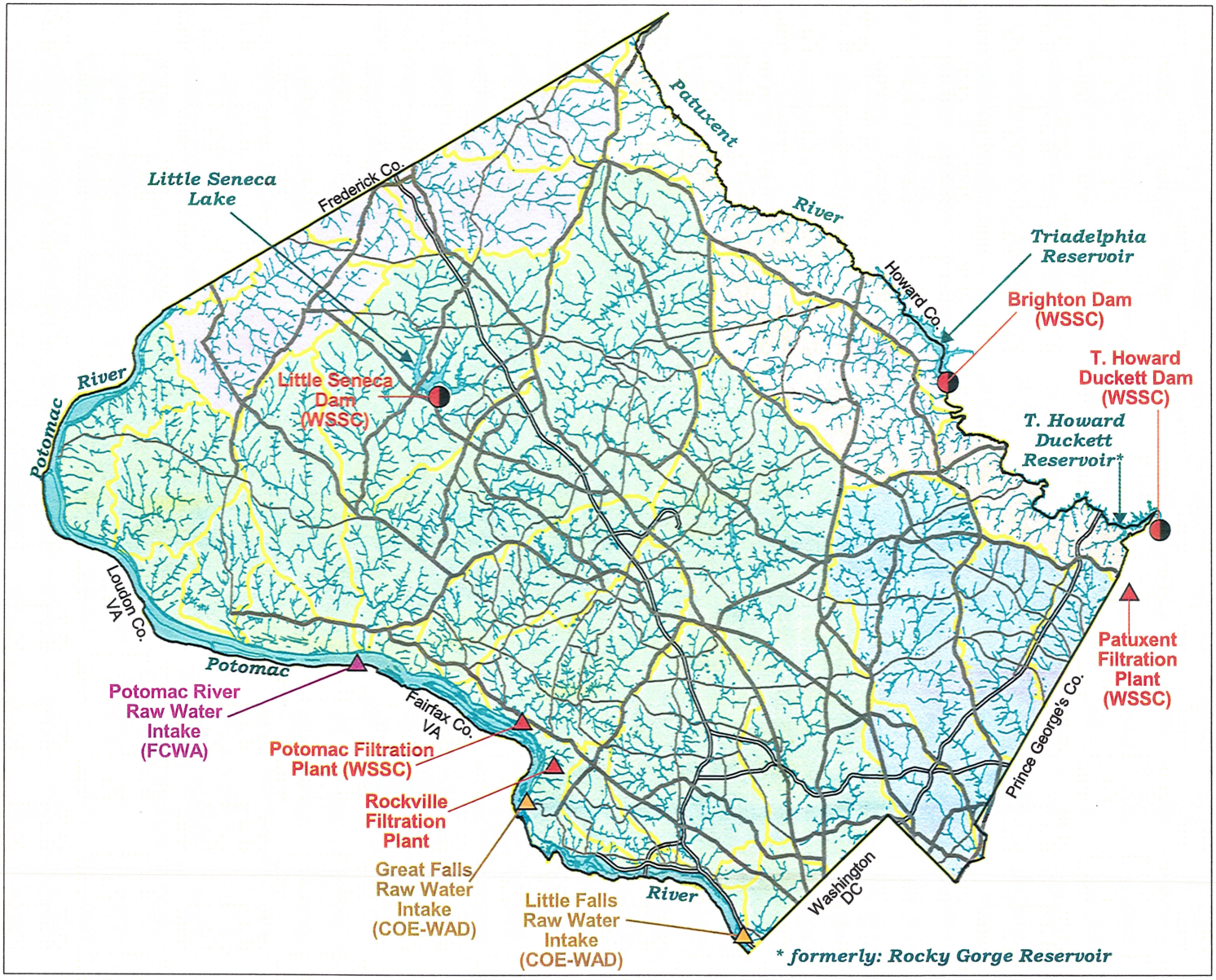
B. Water Supply Sources -- Community water service in the WSSD depends on surface water supplied from the Potomac and Patuxent Rivers on either side of the county (see Figure 3-F3).

1. Potomac River -- The Potomac River is the larger of the two sources of surface water supply for Montgomery County. The river forms the southwestern border of Montgomery County with Virginia and serves as the source of drinking water to many communities in Maryland, Virginia, West Virginia, and Washington D.C. The Potomac River supplies over 40 billion gallons of water annually to the bi-county area of Montgomery and Prince George's Counties. WSSC withdraws water from the Potomac River at Watkins Island, approximately two miles upstream from Great Falls, near the mouth of Watts Branch.

In the Metropolitan area, the Potomac River is also a major source for Washington, D.C. (supplied by the Washington Aqueduct Division [WAD] of the U.S. Corps of Engineers), the City of Rockville, and the Fairfax County Water Authority (FCWA). All three utilities withdraw raw water from the Potomac River along the reach of the river within Montgomery County. The WAD withdraws water from the river at Great Falls and at Little Falls; Rockville withdraws water near its treatment plant at Sandy Landing Road; FCWA withdraws water from the Virginia side of the river near Great Seneca Creek and the Seneca Pool.

Two impounded water supplies can supplement flows directly to the Potomac River during periods of low flow. The Jennings Randolph Reservoir is located near Bloomington, Maryland, on the North Branch of the Potomac River on the State boundary with West Virginia, 200 miles upstream from the WSSC Potomac intake. This reservoir was completed in 1981 and provides 30 billion gallons of raw water storage with 13 billion gallons currently allocated to water supply. The Washington Metropolitan Area (WMA) water suppliers (WSSC, WASA, *et al*.) have purchased ownership of this storage capacity from the Federal government. The remaining capacity is for flood control and environmental flow augmentation. The Jennings Randolph Reservoir (formerly, the Bloomington Reservoir) is operated by the U.S. Army Corps of Engineers (COE).

Figure 3-F3: WSSC Surface Water Supply Sources



MAP LEGEND

- Major County Roads
- US & Interstate Highways
- Streams
- Major Rivers - Lakes
- Potomac River (Direct) Watersheds
- Anacostia River Watersheds
- Patuxent River Watersheds
- Monocacy River Watersheds

WSSC Water Supply Facilities

- Water Filtration Plants
- Dams
- Fairfax Co. Water Authority (FCWA) Raw Water Intake
- Washington Aqueduct District (COE-WAD) Raw Water Intakes

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The COE's original intent was to supplement flows released from the Jennings Randolph Reservoir with flows from the Savage Reservoir, located north of Bloomington. Flows from the Savage Reservoir, which are relatively basic, were intended to neutralize releases from the Jennings Randolph Reservoir, which the COE expected to be acidic due to upstream mine drainage. However, the acidity problem never developed, and the COE had not needed to make water supply or water quality releases from the Savage Reservoir until 2002 when WMA water suppliers demanded them. The WMA water suppliers pay 80 percent of the Savage Reservoir's capital replacement and operating costs, but have not received any benefit from that investment until 2002. In active discussions with the Upper Potomac river Commission, the WMA water suppliers are reevaluating the purpose, use, and financing of the Savage Reservoir.

The other impoundment, Little Seneca Lake, built primarily for water supply, is located near Boyds in western Montgomery County, and impounds 4 billion gallons of raw water storage. WSSC operates the dam and release facility as part of the Metropolitan Low Flow Agreement. Table 3-T1 lists information on the impounded water supplies within Montgomery County, which are also shown on Figures 3-F3 and 3-F4.

The cost allocation formulas for Jennings Randolph and Savage Reservoirs and for Little Seneca Lake were developed in 1982 and incorporated into the agreements listed on this page. These formulas are the subject of active re-negotiation by the three WMA utilities. The allocation percentages in the agreements for the three utilities were based on projected growth in demand between 1982 and 2000. The actual growth pattern turned out to be substantially different resulting in a mismatch between the cost allocations and the actual use of the regional facilities. The utilities are currently negotiating a revised cost-allocation formula, one that will more closely match financial contribution to usage. This will eliminate the current regional inequities in financing these three reservoirs.

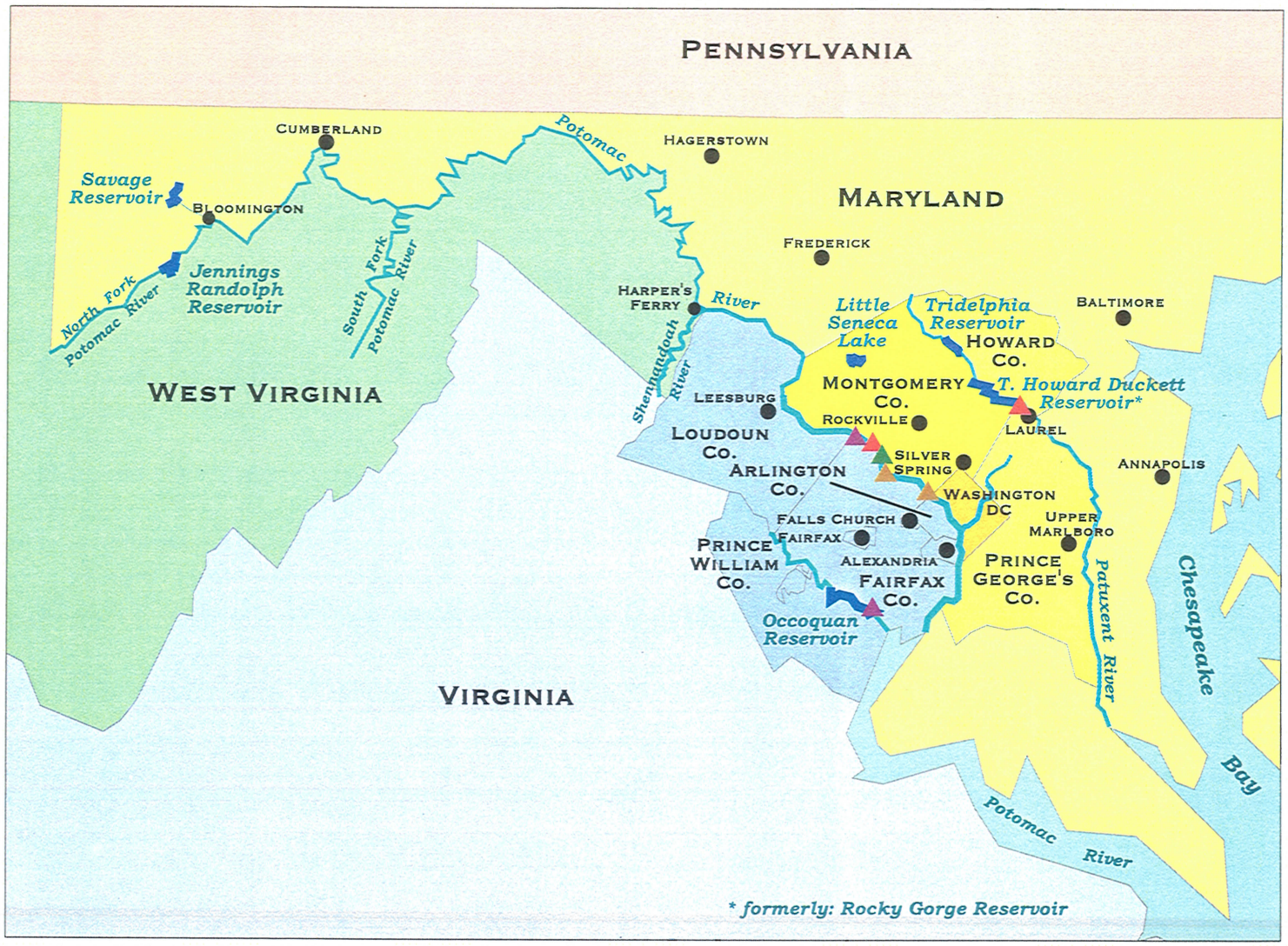
Table 3-T1: Inventory of Existing Impounded Supplies in Montgomery County

Source	**Potomac River**	**Patuxent River**	
Owner **Name**	Public: [A] **Little Seneca Lake** (Little Seneca Dam)	WSSC: **Triadelphia Reservoir** (Brighton Dam)	WSSC: **T. Howard Duckett Reservoir** [D] (T. Howard Duckett Dam)
Crest Elevation (above sea level)	385 feet	366.45 feet	286.45 feet
Spillway Length	300 feet	234 feet	189 feet
Total Length of Dam	600 feet	995 feet	840 feet
Height of Crest Above Stream Bed	77 feet	66.45 feet	125.45 feet
Flooded Area at Crest Elevation	530 acres	800 acres	810 acres
Shore Line Length at Crest Elevation	-	19 miles	35 miles
Area of Land Owned	530 acres [A]	2,963 acres	3,023 acres
First Overflow of Dam Crest	-	1944	1955
Capacity of Reservoir	4.5 billion gallons [C]	5.5 (7.0 [B]) billion gallons	5.2 (6.4 [B]) billion gallons
		Total Capacity = 10.7 (13.4 [B]) billion gallons	
Safe Yield	-	45.3 MGD	
Average daily withdrawal	-	42 MGD	

[A] Financed by WSSC, District of Columbia, and Fairfax County Water Authority.
[B] Total volume; additional volume in excess of water supply capacity is used for flood mitigation.
[C] Total capacity of reservoir is 4.5 billion gallons; useable capacity is 4 billion gallons.
[D] Formerly Rocky Gorge Reservoir

2. Patuxent River -- The Patuxent River forms the northeastern border of Montgomery County with Howard County, and serves as another major source of water supply for the two counties supplied by WSSC. There are two water supply impoundments along the Patuxent River operated by WSSC, the Triadelphia and the Rocky Gorge Reservoirs, created by the Brighton and T. Howard Duckett Dams, respectively. They are used mainly for water supply (10.7 billion gallons), with some capacity (2.7 billion gallons) used for flood control. The Triadelphia Reservoir is located at Brighton in Montgomery County, 14 miles north of the

Figure 3-F4: Major Water Supply Reservoirs Serving the Washington Region



25 0 25 50 75 100 Miles

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MAP LEGEND
Water Supply Intakes
- Washington Surburban Sanitary Commission
- Fairfax County Water Authority
- U.S. Army Corps of Enginneers - Washington Aqueduct District
- City of Rockville

Reservoirs
Rivers
Streams

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Department of Environmental Protection
Montgomery County Maryland

Watershed Management Division
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northernmost tip of Washington and has a storage capacity of 7.0 billion gallons. The Rocky Gorge Reservoir is located approximately two miles northwest of Laurel, in Prince George's County and has a storage capacity of 6.4 billion gallons. Table 3-T1 lists the existing impounded water supplies along the Patuxent River, which are also shown on Figures 3-F3 and 3-F4.

C. Water Supply Sources Programs and Policies -- The use of water supply sources in this region is managed and protected through a number of Federal and regional programs and agreements. The following include a brief description of some of these programs and policies currently in place.

1. Regional Drought Management in the Potomac River Basin -- In order to provide regional service during drought conditions and ensure that there is adequate flow in the River to meet the environmental flow-by, the Cooperative (CO-OP) Section of the Interstate Commission of the Potomac River Basin (ICPRB) coordinates releases from the Jennings Randolph Reservoir, located near Bloomington, Maryland, on the North Branch of the Potomac River, and the Little Seneca Lake in the County on Little Seneca Creek. These two sources of water augment the Potomac River during periods of extreme low flow in the Washington Metropolitan area. The agencies that have intakes in Montgomery County and which are considered the Regional Water Supply system during a drought are: 1) The Washington Suburban Sanitary Commission, 2) the Fairfax County Water Authority (FCWA), and 3) the Washington Aqueduct Division (WAD) of the Corps of Engineers that serve the District of Columbia, Arlington, Falls Church, and a small portion of Fairfax County. The City of Rockville and the Town of Leesburg also draw their water from the Metropolitan area of the Potomac River.

Nine agreements determine how water the region's utilities distribute and use water during drought and how they pay for it. The agreements, in chronological order, are:

Table 3-T2: Potomac River Regional Drought Agreements

Signatories	Major Provisions
Low Flow Allocation Agreement (LFAA) (1978)	
▪ State of Maryland ▪ State of Virginia ▪ District of Columbia ▪ U.S. Army Corps of Engineers ▪ WSSC ▪ FCWA	This agreement establishes allowable withdrawals among major water users of the Potomac River during periods when there is not sufficient supply to allow unrestricted withdrawals. As a result of the 1982 Regional Water Supply Agreements, the chance of invoking the LFAA is projected to be less than 5 percent during a repeat of the worst drought of record.
Modification No. 1, Potomac River Low Flow Allocation Agreement (1982)	
▪ State of Maryland ▪ State of Virginia ▪ District of Columbia ▪ U.S. Army Corps of Engineers	This amendment to the LFAA provides for releases from the Jennings Randolph and Savage Reservoirs and Little Seneca Lake to be subject to the allocation formula of the LFAA. Most importantly, as long as there are legally enforceable Regional Water Supply Agreements, the 1988 freeze provision of the LFAA will be inoperative. The 1988 freeze provision would have limited FCWA, WSSC, and District of Columbia withdrawal ratios to 1988 actual levels unless a water supply agreement was reached. Since the District of Columbia is the largest withdrawer of water, the District would have attained a disproportionately large share of water versus need over time. The Regional Water Supply Agreements are predicated on all water users obtaining water as needed and the sharing of resources.

Table 3-T2: Potomac River Regional Drought Agreements

Signatories	Major Provisions
Water Supply Coordination Agreement (1982)	
▪ Corps of Engineers ▪ Fairfax Co. Water Authority ▪ WSSC ▪ District of Columbia ▪ ICPRB.	This agreement establishes the precedents that the major water suppliers will operate systems in a coordinated manner during a drought and that water withdrawal will be based on need, not on the relative share paid for water storage facilities. This agreement also identifies the CO-OP section of the Interstate Commission of the Potomac River Basin (ICPRB) as the agency to administer provisions of the Drought Related Operations Manual, such as issuing long-range water supply projections and directing releases from Jennings Randolph and Little Seneca lakes during a drought. The water utilities fund the activities of the CO-OP section as follows: WSSC - 50 percent, FCWA - 20 percent, and WASA - 30 percent.
Agreement for Future Water Supply Storage Space in the Bloomington Reservoir (1982)	
▪ District of Columbia ▪ Corps of Engineers ▪ WSSC ▪ Fairfax Co. Water Authority	This agreement entitles the District of Columbia, the Fairfax County Water Authority and the WSSC to 36.78 percent of Jennings Randolph Reservoir storage capacity known as future supply. The Metropolitan Areas share would equal 13.37 billion gallons when the reservoir is full. In return, the three non-federal signatories are required to pay 27.4% of the construction cost (local share estimated at $54.2 million, includes interest over 50 years), 34.75% of the cost of major replacement items and 28.56% of the annual operation and maintenance costs. Jennings Randolph water not contracted for water supply is used for water quality improvement in the North Branch of the Potomac River. Water Quality releases upstream also indirectly benefit local jurisdictions by delaying the time when low flows are experienced in the Washington area. The WMA water utilities fund the capital, operations, and maintenence costs for the water supply storage in the Jennings Randolph Reservoir.
Note: The Maryland Potomac Water Authority (MPWA) was created in 1978 to coordinate local governments in the acquisition of water storage of the Jennings Randolph Reservoir. However, the agreements of 1982 which provided for purchasing of storage by the District of Columbia, the Fairfax County Water Authority and WSSC have made the function of the MPWA unnecessary.	
Bloomington Payment Agreement (1982)	
▪ Fairfax Co. Water Authority ▪ District of Columbia ▪ WSSC	This agreement delineates the three major water users individual responsibility to pay for Jennings Randolph water supply in the agreed to ratios. This agreement was necessitated because the Corps of Engineer required that payments had to be guaranteed. The District of Columbia was unable to make such a guarantee because their budget must be approved annually by Congress. Under the provisions of the agreement, should a user default in payment, another user can make the payment and sue the defaulter for payment plus penalty. In addition, the defaulter loses right to use Jennings Randolph water supply while in default.
Little Seneca Lake Cost Sharing Agreement (1982)	
▪ District of Columbia ▪ Fairfax Co. Water Authority ▪ WSSC	This agreement establishes the cost shares and payment mechanisms to fund construct on of Little Seneca Lake in Montgomery County. Capital and operating and maintenance cost were distributed according to the following ratios: WSSC 50%; District of Columbia 40%; and Fairfax County Water Authority 10%.

Table 3-T2: Potomac River Regional Drought Agreements	
Signatories	**Major Provisions**
Savage Reservoir Maintenance and Operation Cost Sharing Agreement (1982)	
▪ District of Columbia ▪ Fairfax Co. Water Authority ▪ WSSC ▪ Allegany County, Md. ▪ Upper Potomac River Commission (UPRC)	This agreement addresses water releases from the Savage Reservoir, which as relatively basic, were intended to neutralize releases from the Jennings Randolph Reservoir, which were expected to be acidic due to upstream mine drainage. This dilution effect can be viewed as additional water supply gained without requiring local funds for the construction of the Savage Reservoir. The signatories exclusive of the UPRC have agreed to fund the annual operations and maintenance, and replacement and repair costs of Savage Reservoir according to the following percentages: Fairfax County Water Authority 16%; District of Columbia 24%; WSSC 40%; and Allegany County 20%. (See the preceding discussion of the reservoir for additional information.)
Metropolitan Washington Water Supply Emergency Agreement (1994)	
▪ District of Columbia ▪ Arlington, Fairfax, Loudoun, Montgomery, Prince George's and Prince William Counties ▪ Towns or Cities of Alexandria, Bowie, College Park, Fairfax, Falls Church, Gaithersburg, Greenbelt, Manassas, Rockville, Takoma Park, and Vienna ▪ Council of Governments ▪ Fairfax Co. Water Authority ▪ Loudoun Co. Sanitation Auth. ▪ WSSC	This agreement establishes three plans for coordinating regional actions in the event of emergencies that affect water supply from the Potomac River to the Washington Metropolitan Region. The first plan provides a regional response mechanism for health-related emergencies in the Washington Aqueduct Division system. The second plan provides a mechanism for emergencies that affect more than one of the utilities that withdraw raw water from the Potomac River. The final plan describes the routine planning and cooperative operating procedures which have significantly reduced the risk of drought affecting the region's water supply. Background information describing the conditions leading up to the plan and the procedures for updating it is also provided.
Metropolitan Washington Water Supply and Drought Awareness Response Plan: Potomac River System (2000)	
▪ District of Columbia ▪ Arlington, Fairfax, Loudoun, Montgomery, Prince George's and Prince William Counties ▪ Towns or Cities of Alexandria, Bowie, College Park, Fairfax, Falls Church, Gaithersburg, Greenbelt, Manassas, Rockville, Takoma Park, and Vienna ▪ Council of Governments ▪ Fairfax Co. Water Authority ▪ Loudoun Co. Sanitation Auth. ▪ WSSC	This COG plan provides implementation steps during drought conditions for the purpose of coordinated regional response. The Plan consists of two interrelated components: a regional year-round plan emphasizing wise water use and conservation, which is currently under development; and a water supply and drought awareness and response plan. The water supply and drought awareness plan contains four stages: • Normal: Wise Water Use Program • Watch: voluntary water conservation measures • Warning: voluntary water restrictions • Emergency: mandatory water restrictions This plan is primarily designed for those customers who use the Potomac River for their drinking water supply source. The Plan will eventually be expanded to incorporate all water supply systems throughout the region.

2. Regional Drought Operations – During times of declared drought, the regional water supply system will operate according to the Drought Operations Manual of the 1982 Water Supply Coordination Agreement. Operations rules and procedures for reducing the impacts of severe droughts in the Potomac River for the Washington Metropolitan Area Water Suppliers are as follows:

- Make the most efficient use of all water supply facilities, including but not limited to the Potomac River, Jennings Randolph Lake, Occoquan Reservoir, Triadelphia Reservoir, Rocky Gorge

Reservoir, and Little Seneca Lake to meet all water supply needs for the Washington Metropolitan Area.

- Maintain the probability of invoking the Restriction Stage of the Potomac River Low Flow Allocation Agreement at less than 5 percent during a repeat of the historical stream flow record.
- Maintain the probability of entering the Emergency Stage of the Potomac River Low Flow Allocation Agreement at less than 2 percent with full reservoirs on June 1 of any year.
- Maintain the probability of not refilling any reservoir used for Washington Metropolitan Area water supply to 90 percent of useable capacity by the following June 1 at less than 5 percent during a repeat of the historical stream flow record.
- Maintain flows in the Potomac River below Seneca Pool as agreed to by the signatories to the Potomac River Low Flow Allocation Agreement.
- Minimize conflict between normal utility operations and drought operations.
- Provide consistency with the requirements of the Potomac River Low Flow Allocation Agreement.

The underlying principle in this operation procedure is to reduce unneeded reservoir releases by making larger releases only as necessary to meet water needs. The capability of existing suppliers can be substantially extended in this manner. The Water Supply Coordination Agreement for cooperative system management is the critical element which allows the users to obtain the maximum benefits and reduce water wastage.

During a drought, WAD and the CO-OP Section of the ICPRB play key roles in determining the operation of the Regional Water Supply System. The WAD is charged with determining when to declare alert, restriction, or emergency drought stages. If a restriction or emergency stage is declared, the WAD allocates each user's fair share of withdrawal based on previous usage. Prior to restriction or alert stage designation, the CO-OP Section is responsible for coordinating water withdrawals to make the most efficient use of all water supply facilities. To accomplish this objective, CO-OP produces forecasts of water supply and need and determines how much water the WSSC and FCWA should be withdrawing from non-Potomac River supplies on a daily basis. The CO-OP in consideration of the needs of the WAD, WSSC, and FCWA, also directs releases from Jennings Randolph Reservoir and Little Seneca Lake.

The signing of the Water Supply Agreements of 1982 and the completion of Little Seneca Lake in the fall of 1984 resulted in a regional consensus that area raw water supply needs are satisfied, at least through the year 2020. Recent water demand forecast and resource adequacy analysis by ICPRB/CO-OP confirms that presently available resources will be adequate for the region until approximately the year 2020 in the event of a repetition of the drought of record. Although ICPRB's recent analyses extended forecasts to 2040, the water demand forecasts beyond 2020 were considered to be only rough approximations based on extrapolations of population projections.

3. Potomac River Environmental Flow-By -- As a heavily-used water resource, the Potomac River requires careful management to ensure its value for the utilities which draw its water and the health of its natural ecosystem. Part of the purpose of the preceding group of agreements is to ensure that the river has an adequate flow-by through and downstream from the Washington region sufficient to maintain its biological health, even under severe drought conditions. These agreements have assumed a minimum flow-by requirement of 100 million gallons per day (MGD) necessary to support the biological health of the river system.

However, the scientific basis for and adequacy of the 100 MGD flow-by requirement is under review. Maryland DNR, supported by the U.S. Fish and Wildlife Service, ICPRB, and Montgomery County DEP, launched a study of the river's environmental flow-by needs. During the summer and fall of 2002, DEP staff supported this effort, participating in field research in and along the river. A task force will examine the study data in April 2003 with the intent of recommending the best way to establish appropriate low flows for the Potomac River. Montgomery County will continue to pursue vigorously these issues through appropriate forums, as necessary.

Water and Sewer Plan Recommendation
Montgomery County supports continuing scientific evaluation of the Potomac River flow-by necessary to support the river's natural ecosystem. The County recognizes that an agreement on a flow-by substantially different from the existing 100 MGD will require review and possible revision of the inter-jurisdictional agreements on the Potomac River, including the funding of any necessary expansion of low flow augmentation.

4. Potomac Water Filtration Plant Source Water Assessment – MDE and WSSC recently completed a source water assessment (SWA) for the Potomac River and WSSC's water filtration plant. The SWA addresses issues involved with the quality and safety of the raw water the plant draws from the river for treatment and does not directly address finished water quality. From its findings, the SWA recommends the development and implementation of a source water protection plan for the Potomac Plant and for other similar facilities which draw their source water from the river. The SWA predicts the following improvements as a result of the successful implementation of such a plan:

- Reducing the solids loading to the plant,
- Reducing the magnitude and frequency of high pH, high natural organic matter (NOM) events which result from algal, phytoplankton, and macrophyte activities in the Potomac and its tributaries,
- Improving protection from pathogens including *Cryptosporidium* and *Giardia*,
- Reducing the number and severity of taste and odor episodes which occur in the WSSC system, and
- Reducing ammonia levels and chlorine demand in the raw water.

5. Patuxent Reservoir Watershed Protection Agreement -- The Patuxent Reservoirs Watershed Protection Group (PRWPG) was formed by agreement in October 1996 to protect the long-term biological, physical, and chemical integrity of the Triadelphia and Rocky Gorge Reservoirs watershed. Signatories to the agreement include Montgomery County, Howard County, Prince George's County, the Montgomery and Howard Soil Conservation Districts, the M-NCPPC, and the WSSC. The first Action Plan, approved in 1997, listed 10 tasks in three categories:

- **Data Analysis and Collection Tasks**
  - Expand reservoir and tributary water chemistry monitoring
  - Expand tributary biological and habitat monitoring
  - Perform stream corridor assessments and identify erosion hot spots for potential remediation
  - Develop and apply a GIS-based watershed modeling tool
  - Develop a coordinated data and information exchange process
- **Implementation Tasks**
  - Establish an enhanced agricultural management initiative
  - Initiate regular referral of development proposals for WSSC input
  - Seek enhanced on-site septic system treatment efficiency for new replacement systems
- **Public Information Tasks**
  - Enhance public outreach and involvement initiatives
  - Complete annual reports

These tasks were based on the consensus recommendations of the 1997 *Comprehensive Management Planning Study for the Patuxent Reservoir Watershed* to protect six priority resources:

- Reservoir/water supply
- Terrestrial habitats

- Stream systems
- Aquatic biota
- Rural character and landscapes
- Public awareness and stewardship

Since then, the signatories and support agencies have successfully accomplished the following:

- Expanded reservoir and tributary water chemistry monitoring necessary for baseline and trends analysis
- Conducted and analyzed at least one round of biological and habitat monitoring to assess tributary streams
- Completed stream corridor assessments to locate, assess, and rank habitat and water quality problems on tributary streams and begun inventories of projects to address these problems
- Developed watershed-wide geographic information system (GIS) coverages of physical and natural features
- Developed a GIS-based watershed loading model linked to a reservoir eutrophication model to predict changes in reservoir water quality based on changes in watershed land cover characteristics
- Implemented a local-cost share program for streamside agricultural best management practices
- Established a network of programs and contacts through local agencies, schools, and citizen groups for more effective public outreach on watershed awareness and reservoir protection

The member agencies are currently evaluating progress to date, the establishment of quantifiable measures to judge success in protecting these priority resources, the feasible rate of implementation of projects or control strategies, and the need to revise or add additional goals.

The PRWPG has already begun working with the Maryland Department of the Environment as it develops Total Maximum Daily Loads (TMDLs) for the reservoirs. These TMDLs will set limits for pounds per year of sediment that can enter the Triadelphia Reservoir and of nutrients that can enter the Triadelphia and Rocky Gorge Reservoirs. Achieving these regulatory limits is expected to require enhanced water quality best management practices on new development and on agricultural lands, stormwater retrofits on existing development, and increased stewardship by citizens in their yards and everyday activities. It is highly unlikely that achieving the TMDLs will require any changes in existing zoning in these watersheds.

The 1982 "Water Supply Coordination Agreement" also affects the use of the Patuxent River's reservoirs under that agreement's Drought Operations Manual. See Section II.C.1. for additional information.

D. Water Treatment Facilities – The WSSC operates two major filtration plants in its sanitary district which provide water treatment for Montgomery County. These plants draw"raw" or untreated water from the Potomac and Patuxent Rivers and process it into "finished" or drinking water of high quality. Figure 3-F3 shows the location of these plants, and their current status and capacities are provided in Table 3-T3.

Table 3-T3: WSSC Water Treatment Facilities

Facility Owner/Operating Agency Plant Location & Coordinates	**Water Source Treatment Type**	**Rated Plant Capacity Average Production Maximum Peak Flow Storage Capacity**	**Sludge and/or Filter Backwash**	**Status/Comments**
Potomac Filtration Plant WSSC River Road N439,000/E727,000	Potomac River lime, alum, flocculation, filtration, chlorination, fluoridation	capacity: 285 MGD production: 109.3 MGD peak flow: 161.7 MGD storage: 22.05 MGD	discharged to Potomac River after solids are removed	Various treatment processes are currently being upgraded (see Section II.F.2.a.).

Table 3-T3: WSSC Water Treatment Facilities

Facility Owner/Operating Agency Plant Location & Coordinates	Water Source Treatment Type	Rated Plant Capacity Average Production Maximum Peak Flow Storage Capacity	Sludge and/or Filter Backwash	Status/Comments
Patuxent Filtration Plant WSSC Sandy Spring Road (Prince George's Co.)	Patuxent River (Rocky Gorge Reservoir) lime, alum, flocculation, filtration, chlorination, fluoridation	capacity: 56.0 MGD production: 35.4 MGD peak flow: 47.7 MGD storage: 18.36 MGD	discharged to sanitary sewer	The plant is currently under extensive renovation and upgrade.
See Figure 3-F3 for the locations of these facilities. See Table 3-T11 for information on the City of Rockville's filtration plant.				

1. Potomac Water Filtration Plant -- This facility, located on River Road (Route 190) at Lake Potomac Drive, two miles upstream from Great Falls, serves both Montgomery and Prince George's Counties. The plant draws water from the Potomac River just downstream from the mouth of Watts Branch. The Potomac Water Filtration Plant has a State-permitted maximum intake capacity of 400 million gallons per day (MGD), and a rated treatment capacity of 285 MGD. However, the plant generally operates in a range of 105 to 160 MGD.

Until recently, solids removed from the intake water were discharged directly back into the Potomac River. In 1996, MDE and WSSC entered into consent agreement for WSSC to build facilities for the removal of the sedimentation basin solids from the plant discharge, except for periods of high river flow when direct discharge will be allowed. This solids handling facility recently started operation; solids from this process are land applied under contracts with WSSC. Anticipating future demand, WSSC has studied and is beginning to implement treatment process improvements at the plant to guarantee its sustained rated capacity of 285 MGD. (See Section II.E.2.a. for additional information.)

2. Patuxent Water Filtration Plant --This facility is located on Sandy Spring Road (Route 198) at Sweitzer Lane near Laurel in Prince George's County, approximately one-half mile east of the Montgomery County border. Although the plant serves primarily Prince George's County, its effective reach extends west into Montgomery County to approximately Georgia Avenue (Route 97), according to a recent WSSC study. The plant draws water from the T. Howard Duckett Reservoir on the Patuxent River. WSSC is currently replacing the Patuxent Filtration Plant with an advanced conventional water treatment plant on the existing facility site. The new plant will have a nominal treatment capacity of 56 MGD and the capacity to provide up to 72 MGD. Solids removed from the water of the Patuxent River are thickened in basins along Route 198 (across from the plant) and then are discharged to a sewer that leads to the Parkway Wastewater Treatment Plant. Most of the plant's processed water is gravity fed to the WSSC sewerage system in Prince George's County. Pumping and transmission capacity also exists to provide approximately 18 MGD to the Montgomery High Zone and 36 MGD to the Montgomery Main Zone. Anticipating a need to improve water supply system redundancy in the WSSD, WSSC has proposed a second phase of improvements at the plant which will expand its sustained capacity to 72 MGD and its peak rated capacity to 120 MGD. (See Section II.E.2.a. for additional information.)

E. Water Distribution and Storage Systems -- WSSC delivers finished drinking water from its treatment plants to consumers throughout the WSSD community water service area in Montgomery County by a series of pumping facilities and transmission mains. Providing adequate water service also requires strategically located water storage facilities serving sections of the county. The following sections discuss these distribution and storage systems.

1. Water Service Pressure Zones -- The WSSD community water service area within Montgomery County is divided into separate pressure zones. These are grouped into two major zones, as shown in Figure 3-F6: the WSSD Main Zone serves the southern and eastern parts of the county, and the Montgomery County High Zone serves the northern and western parts. The division between these two major pressure zones traverses the county west to east through western Potomac, Travilah, Rockville, Norbeck, Cloverly, and

Fairland. Each of the major zones consists of several smaller pressure zones as shown in Table 3-T4 and Figure 3-F5. The WSSD Main Zone also serves Prince George's County.

WSSC divides areas of the county into water pressure zones based primarily on ground elevations. Each pressure zone must have its own source or sources of supply, transmission systems (i.e., pumping stations or pressure reducing valves and transmission mains), and storage facilities to transport water from the sources to the points of use. A water supply source for a pressure zone may be a water filtration plant and/or another adjacent pressure zone. Water supply to zones at higher elevations must be pumped, while water supply to lower elevations must be controlled by pressure regulation valves. The water supplied to each zone is maintained at a pressure sufficient to provide adequate quality and quantity of service to the consumers in that zone. The water system within each of these zones may be designed to serve the population of that zone as well as adjacent zones. Because of the large area and the number of pressure zones within the County, the availability of mutual backup support capabilities is extremely important. This is accomplished through the use of interconnected pressure zones, the two sources of supply, and water storage facilities. Table 3-T4 lists the hydraulic grade and primary water supply for the pressure zones within Montgomery County, showing which zones are interdependent with others. WSSC establishes new pressure zones and adjusts zone boundaries in response to projected development demands and improvements to system efficiency.

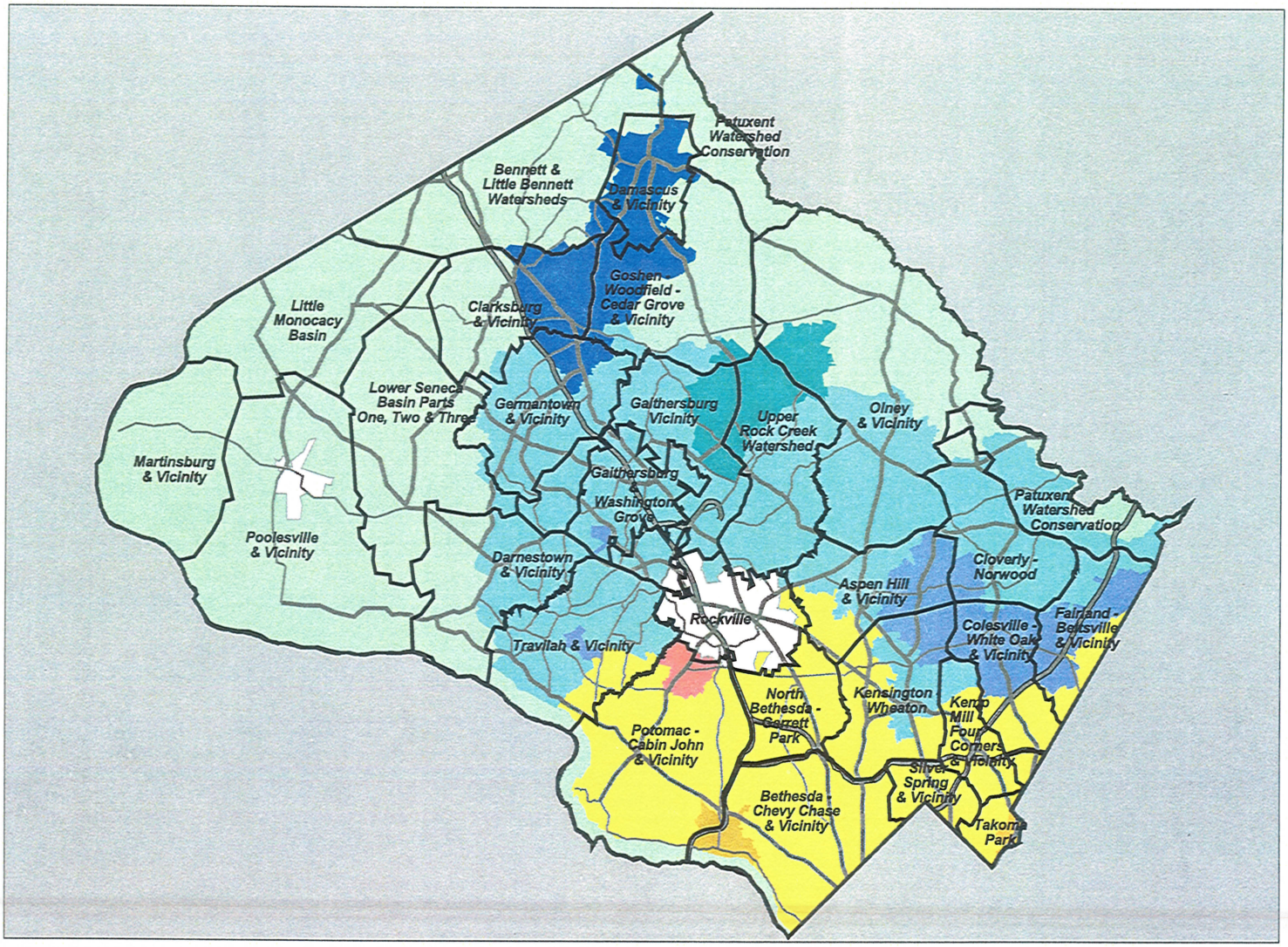
TABLE 3-T4: WSSC Water Pressure Zones in Montgomery County

Major Pressure Zones	Normal Hydraulic Grade	Primary Water Supply Source
WSSD Main Zone		Potomac Plant
Prince George's Co. Main Zone	320 Feet	Potomac Plant
Montgomery Co. Main Zone	495 feet	Potomac Plant
Cabin John Zone	350 feet	Montgomery County Main Zone
Falls Road Zone	552 feet	Montgomery County Main Zone
Montgomery County High Zone		Potomac Plant
Colesville Zone	560 feet	Browns Corner Zone
Brown's Corner/Shady Grove Zone	660 feet	Potomac and Patuxent Plants
Airpark Zone	685 feet	Shady Grove Zone
Brink Zone	760 feet	Shady Grove Zone
Cedar Heights Zone	836 feet	Brink Zone
Damascus Zone	960 feet	Cedar Heights Zone

The County is divided into 28 planning areas, each area forming a fairly cohesive district bounded by a major highway or natural border such as a stream valley. These planning areas are determined by legislative action of the County Council. The pressure zones serving each of the planning areas are shown in Figure 3-F5.

2. Water Pumping Stations -- Community water service in the Montgomery County portion of the WSSD depends on pumping systems from both the Potomac and Patuxent Filtration Plants. Because all finished water leaving the Potomac Plant must be pumped, the plant output cannot exceed its finished water pumping capacity. The Potomac Plant Main Zone Pumping Station has a pumping capacity of 234 MGD; the High Zone pumping station provides a pumping capacity of 66 MGD. The Patuxent Main Zone Pumping Station has a capacity of 36 MGD; the Patuxent Plant High Zone Pumping Station has a capacity of 18 MGD. (Note: Water leaving the Patuxent Plant for Prince George's County may also flow by gravity). These pumping stations at the filtration plants are complemented by other stations located throughout the county which boost water pressures to the hydraulic grade of pressure zones rising progressively higher in elevation (see Figure 3-F6). Capacities of water pumping facilities are shown on Table 3-T5.

Figure 3-F5: WSSC Water Pressure Zones and M-NCPPC Planning Areas



MAP LEGEND

- M-NCPPC Planning Areas

Major Roads

- County Roads
- State Roads and Highways
- Federal Highways and Interstates

High Zone Pressure Zones

- Airpark
- Brink
- Brown's Corner/Shady Grove
- Cedar Heights
- Colesville
- Damascus

WSSC Main Zone Pressure Zones

- Cabin John
- Falls Road
- Montgomery County Main
- Prince George's County Main

Areas Outside the WSSC Pressure Zones

- Rockville Service Area
- Poolesville Service Area
- Montgomery County

Montgomery County, Maryland
2003 - 2012
Comprehensive Water Supply and Sewerage Systems Plan

Department of Environmental Protection
Montgomery County Maryland

Watershed Management Division
4/14/03 -- GIS Project File: o:\wwteam\cwsp\2002update\chpt3\3-f5=przone&pa.apr

Table 3-T5: WSSC Water Pumping Facilities			
Pumping Station	**Capacity (MGD)**	**Pumping Station**	**Capacity (MGD)**
WSSD Main Zone		Montgomery County High Zone	
Potomac Plant	234.0	Brink	4.0
Patuxent Plant	36.0	Cedar Heights	10.0
Falls Road	7.8	Colesville	8.0
Montgomery County High Zone		Goshen Road	20.0
Potomac Plant	66.0	Neelsville	10.0
Patuxent Plant	18.0	Norbeck	15.0
Air Park	5.5	Wheaton	34.0

3. Water Transmission Mains -- Major water transmission mains move finished water from WSSC's pumping stations into the various pressures zones, to their associated storage facilities, and ultimately to the smaller, local service mains which serve consumers. These mains generally decrease in diameter as they progress through the system from supply to the point of consumption, depending upon their relationship with other elements of the network. Major transmission lines (over 12 inches in diameter) are shown in Figure 3-F6. Transmission mains leading from the Potomac Filtration Plant consist of 36-inch and 60-inch lines for the High Zone; and 48-inch, 66-inch, and 96-inch diameter lines for the Main Zone. Transmission lines leading from the Patuxent Filtration Plant consist of 20-inch, 24-inch, 30-inch, and three 42-inch lines.

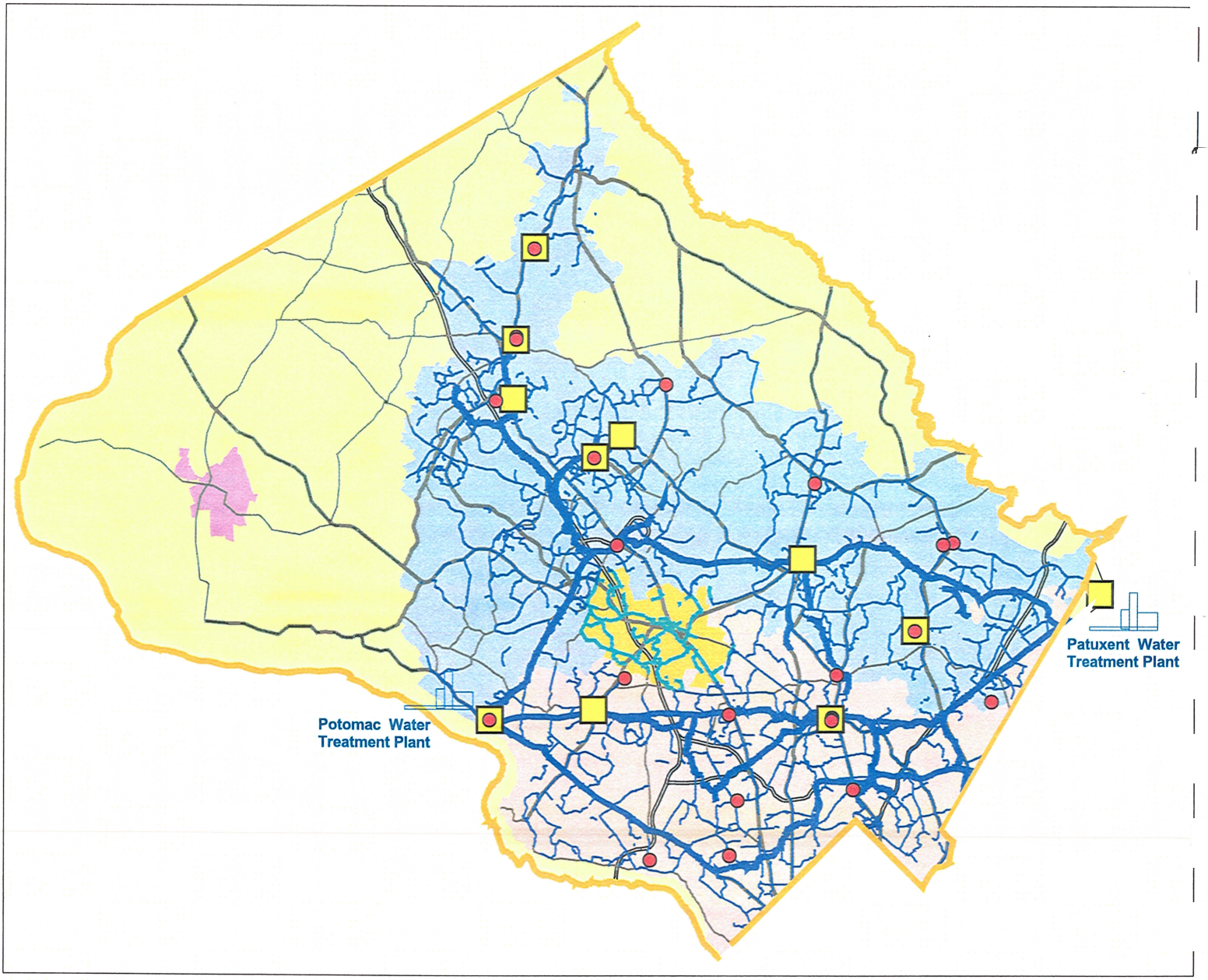
4. Water Storage Facilities -- Associated with each water pressure zone are water storage facilities. These facilities for potable water storage are important elements of the water distribution system, performing the following essential functions:

- Reduce loads on sources of water supply, filtration plants, pumping stations and transmission and distribution mains during periods of peak water demand.
- Provide an essential reserve capacity in meeting fire service demand and provide water pressure during short-term interruptions caused by localized power failures or the need for system repairs.
- Provide "cushions" to pump against while maintaining pressures within the distribution system in certain cases. The cushioning effect of stored water helps prevent damage to piping and other water distribution appurtenances arising from inadvertent surges in pumped water pressure and resultant damage from "water hammer" effects.
- Reduce capital costs required for relatively expensive transmission mains by strategic placement of adequate storage facilities.
- Permit the use of pumping equipment during periods of off-peak electrical demand.
- Provide better stabilized system flow rates over entire water service areas.

The determination of how much storage capacity each pressure zone and each individual facility requires varies widely between utilities. There are no national standards for determining acceptable levels for each of these storage purposes. WSSC has set its storage standards based on the generally accepted levels of reliability and risk. WSSC designs water its water storage facilities to meet the following three storage needs:

- **Equalization Storage:** Meets hourly fluctuations in demand, satisfying all hourly demands in excess of the maximum day demand.
- **Fire Protection Storage:** Provides fire protection due to high flow rates required during a major fire, preventing substantial drawdowns or reversals in water system pressure.
- **Emergency Storage:** Maintains service during emergencies such as pipeline breaks, power outages, and equipment failure, providing 4 hours of maximum day demand.

Figure 3-F6: WSSC Water Distribution System and Facilities



MAP LEGEND
WSSC Water Supply Systems
- Water Storage Tanks
- Water Pumping Stations

Water Mains
- 12" - 24"-Diameter Mains
- 25" - 120"-Diameter Mains

WSSC Water Pressure Zones
- Montgomery County High Zone
- WSSD Main Zone

Rockville Water Mains
- 12 - 24

Major Roads
- County Roads
- State Roads and Highways
- US & Interstate Highways
- Town Of Poolesville
- Rockville Sanitary District

5 0 5 10 15 Miles

N W E S

Montgomery County, Maryland
2003 - 2012
Comprehensive Water Supply and Sewerage Systems Plan

Department of Environmental Protection
Montgomery County Maryland

When designing and siting a proposed water storage facility, WSSC staff first consider the need for elevated, gravity-fed storage within a pressure zone. Elevated storage provides advantages over ground-level, pumped storage in terms of greater system reliability and faster response time to flow demands. Because elevated storage structures have the a greater potential for affecting the visual landscape of a neighborhood, WSSC designs and constructs facilities in an architecturally desirable manner to minimize the impact on the surrounding neighborhood. In rare cases, ground-level or below-ground-level storage may provide gravity-fed storage to a pressure zone, but only where sufficiently high ground elevations exist which allow for such facilities. WSSC develops siting studies for water storage facilities with the involvement of local community. WSSC traditionally locates water storage facilities within or at the periphery of the community water service envelope, which minimizes both transmission costs and intrusion into areas not intended for community service.

WSSC's efforts to develop aesthetically pleasing storage facilities are widely recognized. Examples include the Germantown Elevated Storage Tank--or the "Big Blue Ball"-- on the Montgomery College campus, which is painted to resemble the Earth as seen from space; and the Airpark Tank near Montgomery Village in eastern Gaithersburg, which is designed to resemble a cluster of farm silos.

WSSC currently has 23 water storage facilities distributed throughout Montgomery County. Including the water storage reservoirs at the Potomac and Patuxent Filtration Plants, total available storage capacity is approximately130 million gallons. The capacity of individual public potable storage facilities are indicated on Table 3-T4. The locations of WSSC's water storage facilities are shown in Figure 3-F6.

Table 3-T6: WSSC Water Storage Facilities Serving Montgomery County

Water Storage Facility	Pressures Zones	Capacity (million gallons gross storage)
WSSD Main Zone		
Cabin John Elevated Tank	Cabin John	0.5
Falls Road Standpipe	Falls Road	3.24
Alta Vista Standpipe	Montgomery County Main	0.475
Bradley Hills Standpipes	Montgomery County Main	2.5 + 2.6
North Woodside Standpipe	Montgomery County Main	7.52
Wall Lane Standpipe	Montgomery County Main	2.5
Wheaton Reservoirs	Montgomery County Main	4.0 + 4.0 + 15.0 + 10.0
Montgomery County High Zone		
Air Park Elevated Tank	Air Park	2.0
Brink Elevated Tank	Brink	1.0
Brink Reservoir	Browns Corner/Shady Grove	10.0
Germantown Elevated Tank	Browns Corner/Shady Grove	2.0
Glenmont Elevated Tank	Browns Corner/Shady Grove	0.5
Goshen Road Pumped Storage	Browns Corner/Shady Grove	4.0
Hampshire Greens Elevated Tanks*	Browns Corner/Shady Grove	1.25 + 1.25 + 1.25
Olney Standpipe	Browns Corner/Shady Grove	2.54
Shady Grove Standpipe	Brown's Corner/Shady Grove	5.05
Cedar Heights Reservoir	Cedar Heights	2.45
Colesville Pumped Storage	Colesville	1.0

Table 3-T6: WSSC Water Storage Facilities Serving Montgomery County		
Water Storage Facility	**Pressures Zones**	**Capacity** (million gallons gross storage)
Colesville Elevated Tank	Colesville	2.2
Damascus Elevated Tank	Damascus	1.5
Potomac Plant Reservoirs**		23.34
Patuxent Plant Reservoirs**		18.36
TOTAL STORAGE AVAILABLE TO MONTGOMERY COUNTY		130.03
* Replaces the Browns Corner Standpipe (2.0 mg) demolished in 2002 ** Provides storage at the filtration plants for flows pumped to either the Main or High Zones.		

5. Distribution System Interconnections – WSSC serves or has system interconnections with the jurisdictions shown in Table 3-T7. Some of these jurisdictions have agreements with WSSC for water supply as everyday supply, and/or for emergencies only and/or to meet peak demands. If all supply commitments to other jurisdictions were fully utilized, including current withdrawals where no agreement exists, the total withdrawals would exceed 15 MGD.

Table 3-T7: Interconnections with the WSSC Water System		
Jurisdiction	**Allowable Withdrawal**	**Average Withdrawal**
Andrews Air Force Base*	No Agreement**	2.3 MGD**
City of Bowie*	No Agreement	0 MGD
Charles County	1.4 MGD	0 MGD
Howard County	5.0 MGD	0.9 MGD
City of Rockville***	6.0 MGD	0.02 MGD
Washington, DC	No Agreement	0.04 MGD
* Within Prince George's County ** An agreement is currently under negotiation; regular withdrawal only recently began. *** Within Montgomery County; see Table 3-T13 for specific interconnection locations.		

6. System Redundancy -- This plan promotes general water supply system designs where large water pressure zones, such as the WSSD Main Zone and the Montgomery County High Zone, have equal and adequate protection from prolonged major service interruptions. Such service interruptions could include a filtration plant outage similar to that which occurred in 1977, which resulted in 15 hours of complete shutdown and 2.5 days of partial shutdown, or breaks in major transmission mains, or any other occurrence that could substantially reduce water service to WSSC customers. WSSC designs the water supply system within some pressure zones to allow it to also serve an adjacent pressure zone. WSSC uses interconnected pressure zones, the two sources of supply, and water storage facilities to accomplish this important mutual backup support capability.

There are a small number of interconnections between the District of Columbia and WSSC systems in Montgomery and Prince George's Counties. However, they are too small to transfer adequate supply of water between the systems during emergency situations caused by damage to treatment and distribution facilities. At this time, there are no system interconnections which provide for substantial system redundancy from outside the WSSC service area.

The Patuxent Pumping Station that serves Montgomery County can provide up to 20 mgd to the High Zone and 36 mgd to the Main Zone during an emergency. WSSC has initiated planning for an expansion of this filtration plant's capacity (see Section II.F.2.v.).

F. Projected Water Demand and Supply System Needs -- A critical role of the County's Water and Sewer Plan is not only addressing current water supply needs, but also projecting and adequately planning for future water needs based on the County's growth forecasts and historic water demand. The following sections provide the basis for and determination of future community water demand in Montgomery County and the WSSD. The Plan also provides a summary of the major capital facilities needed to satisfy that projected demand.

1. Overall Water Supply System Demand -- Table 3-T8 presents WSSC' s daily average and maximum water production levels since 1980. Based upon analysis of the latest water production and consumption data, WSSC has developed the following the water production use for growth projections for planning water system improvements:

- Single-Family Dwelling Unit (SFDU): 231 gallons/day (gpd)
- Employees: 51 gpd
- Multi-Family Dwelling Unit (MFDU): 209 gpd

Table 3-T8: WSSC Historic Water Production

Calendar Year	Average Production (mgd)	Maximum Day Production (mgd)	Maximum to Average Ratio	Calendar Year	Average Production (mgd)	Maximum Day Production (mgd)	Maximum to Average Ratio
1980	143	193	1.35	1991	171	256	1.5
1981	140	187	1.33	1992	162	220	1.36
1982	142	196	1.38	1993	167	243	1.45
1983	147	215	1.46	1994	173.5	231	1.33
1984	145	199	1.38	1995	167.1	234	1.4
1985	149	197	1.33	1996	161.3	199	1.24
1986	161	227	1.41	1997	164.7	245.8	1.49
1987	163	239	1.46	1998	166.6	219.8	1.32
1988	170	267	1.57	1999	168.2	263.4	1.57
1989	165	228	1.38	2000	162	200.8	1.24
1990	167	235	1.41	2001	167.4	253.2	1.51

Note: Data includes all of the WSSC service area (Montgomery and Prince George's counties) Source: WSSC- Planning Group

WSSC has prepared water demand projections through the year 2020 for Montgomery County (Table 3-T9), using COG/M-NCPPC Round 6.2 population forecasts and current water use factors for single-family dwelling units, multi-family dwelling units, and employees.

Table 3-T9: Projected Average Daily Water Demands for Montgomery County

Calendar Year	Total Production (MGD)		
	Main Zone	High Zone	Total
2005	49.13	47.53	96.66
2010	50.59	51.03	101.62
2015	51.62	54.03	105.65
2020	52.65	56.46	109.11

Source: WSSC Planning Group

To account for hourly variation in consumption and for the use and refilling of water storage facilities, consumption criteria must span at least a 24-hour time period. To account for seasonal variations, the criteria specifies the 24-hour period of greatest projected consumption within a given year, generally referred to as the maximum day consumption. The specific numbers are obtained by multiplying the average daily consumption for the year and the maximum day factor, and distributing the result over a typical 24-hour consumption pattern. The maximum day demand factor is the ratio of the peak day demand to the average day demand, and is used in sizing the capacity of the water system facilities. The current maximum day demand factor used by WSSC is 1.49 for system wide facilities, based on a 20% probability exceedance. Table 3-T10 lists WSSC's daily average and maximum water production projections and planned capacity.

Table 3-T10: Projected Water Supply Demands and Planned Capacity Washington Suburban Sanitary District

Calendar Year	Projected Demand (MGD)		Planned Capacity (MGD)* Daily Maximum
	Daily Average	Maximum Daily	
2005	178.7	266.2	341
2010	188.3	280.5	357
2015	196.6	292.9	357
2020	205.2	305.7	357

Source: WSSC Planning Group
** This is planned treatment capacity at both Potomac and Patuxent treatment facilities*

As shown in the preceding table, total water consumption is anticipated to increase in the future, as the population increases. Estimated water consumption at full development represents the average consumption expected when all parcels of land are developed to the extent allowed under current zoning classifications. Since zoning classifications for individual parcels may change and the consumption factors used may also change, the full estimated development needs for production may change and are not shown in the preceding table.

2. Projected Water Supply System Needs – WSSC has identified two mechanisms needed to address the forecasted water demands for the WSSD. The first involves projects which will upgrade and expand the elements of WSSC's water supply systems. Projects which respond to near-future and long-term needs (5- and 10-year priorities) are included in the WSSC FYs 2003 - 2008 capital improvement program (CIP). Appendix A of this Plan includes a summary listing of WSSC's current community water systems CIP projects affecting the county. For specific information on any of these projects, please contact the appropriate agency or municipality. The second mechanism involves reducing consumer demand for water. Under the Total Water Management Study, WSSC has investigated potential water demand reduction programs intended to conserve water resources, extend the usefulness of existing facilities, and reduce or delay the demand for future system improvements.

a. Projected Source Water and Treatment Facility Needs – The following sections include brief descriptions of WSSC's current and planned studies and facilities needed to meet the projected treatment capacity at each of its water treatment plants.

i. Potomac Water Filtration Plant Reliability/Water Quality Study -- The purpose of the study, which is currently in its final stages, is to determine requirements and alternatives to enable the Potomac Plant to meet the projected water demand of 275 MGD, while reliably meeting the evolving requirements of the Safe Drinking Water Act. The study examined improvements to flocculation, sedimentation, filtration, disinfection processes, and proposed alternatives to improve treatment capability and overall treatment reliability. A number of major projects have been recommended through this study (see the following subsections). Potential new projects include significant modifications to existing treatment processes and the addition of new process facilities. Also as part of its analysis, the study began an examination of the

feasibility and impact of an off-shore raw water intake and raw water storage in a nearby quarry. Further review of these two proposals will proceed under separate projects (see below).

ii. The Potomac Water Filtration Plant Filter Upgrades --This project, currently in progress, was recommended through the Potomac Water Reliability Study. The project provides for improving filter hydraulics, including the replacement of filter media and underdrain; adding new monitoring equipment; replacing filter effluent piping; and improving electrical systems.

iii. Potomac Submerged Channel Raw Water Intake -- This project originated in the Potomac Plant Reliability Study, but now stands as a separate study. This raw water intake would replace the existing Potomac intake at the river channel's bank below the plant at the C&O Canal National Park. The relocated intake would provide the advantage of drawing cleaner raw water, with less sediment load, into the plant for treatment.

iv. Travilah Quarry Reservoir -- This project also originated in the Potomac Plant Reliability Study, but eventually will stand as a separate study. The existing Travilah Quarry (also referred to as the Rockville Quarry) presents an opportunity to provide a substantial volume of raw water storage for the Potomac Water Filtration Plant, as much as 17 billion gallons. The quarry is located approximately 3-1/2 miles northeast of the plant. Some of the options for the quarry which WSSC will examine include raw water emergency storage and filtration to improve water quality by reducing suspended sediments.

Water and Sewer Plan Recommendation
Montgomery County supports WSSC's investigation of the potential uses of the Travilah Quarry to improve the WSSD community water supply system. The future implementation of a plan to utilize the quarry for raw water storage will, of necessity, require a reexamination of the region's drought management agreements and procedures. The revised Potomac Subregion Master Plan, adopted by the County Council in March 2002, endorses this recommendation.

v. Patuxent Water Treatment Plant Implementation – By early 2005, this project will replace the existing Patuxent Water Treatment Plant with a new advanced conventional water treatment facility. The replacement plant, located on the existing site, will have a nominal treatment capacity of new plant with 56 MGD and the capability to provide emergency capacity up to approximately 72 MGD. A second phase, to support future growth, would include an additional 16 MGD of nominal treatment capacity and the ability to provide up to 120 MGD of emergency capacity.

b. Projected Distribution and Storage System Needs – The following sections include brief descriptions of major projects that are either currently underway or planned to address the water distribution system needs in the Montgomery County High Zone and Main Zone.

i. Olney Water Storage Facility -- WSSC has identified a need for additional water storage in the Olney vicinity to prevent a water shortage deficit from occurring by 2005. The proposed location for this facility is on the site of the existing Norbeck Water Pumping Station.

ii. Germantown/Clarksburg Area Projects -- These transmission and storage projects are in response to the growth in the up-county area, primarily in Germantown and Clarksburg. These projects have been identified in the General Plan, the Clarksburg Master Plan, the Montgomery County High Zone Facility Plan, the 1990 M-NCPPC Round 5 population forecasts, and numerous other studies.

iii. Laytonsville Elevated Tank and Pumping Station -- The Town of Laytonsville officials have requested that the County consider extending community water service to the town, citing concerns over groundwater contamination and septic failures as the need for service. WSSC's October 1999 preliminary study concluded that the extension of community water service to the town will require establishing a new water service pressure zone supplied from the existing Airpark Zone. The creation of a new pressure zone will require new transmission mains and storage and pumping facilities. The study identified two alternative

routes for the required water service extension, either along Olney - Laytonsville Road (Route 108) from near Riggs Road, or along Warfield Road from the Airpark Elevated Storage Tank site. WSSC has estimated the construction cost of the needed facilities at approximately $3.14 million. In FY 2002, WSSC began a more detailed facility plan for this project, building on the results of the preliminary study. A recent category map amendment, assigning categories W-4, W-5, and W-6 to parts of the town, started the implementation of a staging plan for the extension of water service in the town.

The County Council still must approve both the provision of community water service for the town in this Plan and the facilities necessary to implement that service in WSSC's CIP budget. In that event, this Plan shall limit that service as directed by the County Council and detailed in Chapter 1 *(Section IV.D.12.g.)*. The general intent of these limitations restrictions is to permanently restrict community water service from those areas of the town and the nearby county zoned for agricultural preservation as of May 8, 2001. The restriction will affect properties zoned AG within the town and zoned RDT within the county.

iv. Potomac Bi-County Supply Main -- This project will significantly increase transmission capacity from the Potomac Water Treatment Plant to the Montgomery County Main Zone and to Prince George's County. The project proposes the construction of approximately 30,200 feet of an 84-inch diameter water main between the intersection of Tuckerman Lane and I-270 and the western terminus of the Bi-County Water Tunnel near the Capital Beltway (I-495).

v. Patuxent Supply Project -- This project proposes the construction of approximately 9,700 feet of 30-inch diameter water main from Norwood Road to New Hampshire Avenue (Route 650). This new main will eventually supply the Hampshire Greens Water Storage Facility and provide redundancy in the event of an outage and subsequent interruption of supply from the Potomac Water Treatment Plant to the Montgomery County High Zone.

vi. Wheaton Water Main Modifications -- Several segments of the existing water transmission mains the Wheaton area are at elevations too high to allow for unrestricted use of existing water storage. This project provides for an eductor system with connections to the existing 48-inch transmission main in Kensington Boulevard and Wheaton Hill Road. The eductor system would deliver the water stored in Reservoirs No.3 and No.4 into the Main Zone system to meet demands on either side of the system's high points.

c. Programs for Sustained Water Conservation and Waste Reduction – WSSC has a variety of programs to promote water conservation. These efforts include:

i. Public Outreach and Education Programs -- WSSC provides educational brochures which promote the importance of water conservation (including its relationship to reduction of waste water loads) and to acquaint County citizens with the "tools" available to accomplish conservation. Special projects focus on water-saving and to promote the use of "common sense" tools of conservation in existing customer units. These projects include the distribution of WSSC's Bottle Kit/Dye Pill distribution and 3 gpm shower flow controls, water-saving idea and conservation poster contests, sponsorship in cooperation with the Montgomery County Recreation Department of "Plumbing Repair Clinics"; and other activities timed to reinforce and to support the WSSC's public education efforts.

WSSC is also a partner in COG's Wise Water Use campaign, a regional program which is coordinated with the 2002 Metropolitan Washington Water Supply and Drought Awareness Response Plan for the Potomac River System. The campaign represents the plan's response to "normal" water supply conditions and includes many ideas for water conservation by users. WSSC provides the largest single source of funding for the regional campaign.

ii. Plumbing Code – Federal regulations require the installation of water saving fixtures (e.g., toilets, shower heads, and sink faucets) in new installations and in applications where plumbing fixtures are being replaced. The WSSC is proceeding with adoption of a model plumbing code that will enable greater regulatory consistency with surrounding jurisdictions.

iii. Rate Structure –WSSC uses a conservation-oriented water/sewer rate structure, which is based on Average Daily Consumption (ADC) in each metered billing period. The rate structure, in effect, charges lower rates per 1,000 gallons for the individual customer unit's total volume of consumption in the lower level of ADC. The billing rates are scaled up on progressively increasing 16 steps as the customer unit's ADC moves up.

iv. Total Water Management Study -- In 1999, WSSC conducted a Total Water Management Study, with the objectives of identifying and developing strategies to conserve water resources, extending the life of available capacity in existing capital facilities, and reducing future capital and operating costs. The study examined a variety of potential conservation measures and projects, including the promotion of and financial incentives for installing water-efficient appliances and fixtures, water-efficient retrofits for existing housing stock, and public education programs. The study's conclusion indicated that WSSC can best meet these objectives through programs designed to improve public education and community outreach concerning water conservation measures and programs.

Water and Sewer Plan Recommendation
County agencies, including WSSC and M-NCPPC, should lead by example with respect to water conservation measures. DEP needs to work with these agencies to develop a plan that encourages the use of appropriate water conservation measures in County facilities. Such a plan could be coordinated with the proposed County Environmental Policy.

3. Facility Planning – WSSC performs a comprehensive study, called a facility plan, for each major project to balance the technical components of engineering and economic factors with environmental issues and public concerns about the design and construction of the project. The study process identifies alternative approaches and their impacts, obtains technical information about alternatives, and determines measures to minimize or mitigate community and environmental impacts. A facility plan determines ways to meet system demands with sufficient lead time in order to avoid a reduced level of service to customers, and to gather and incorporate public input into the technical work. Additional information concerning WSSC's facility studies is provided in Chapter 1, Section III.A.6.

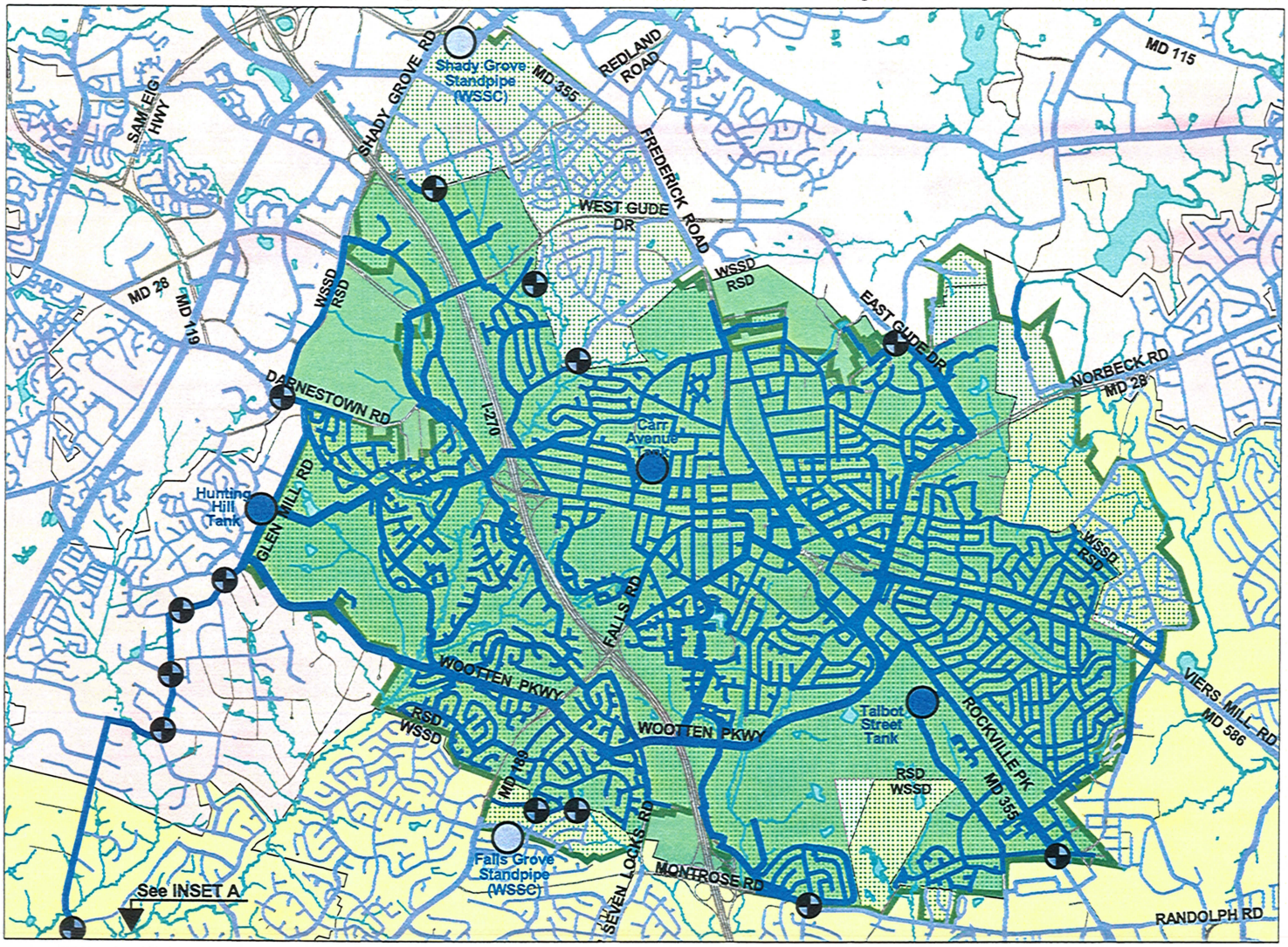
4. Financing the Water Supply System -- WSSC uses several methods to fund the construction and operation of the water supply system. Detailed information concerning WSSC's funding methods is included in chapter 1, Section IV.A.

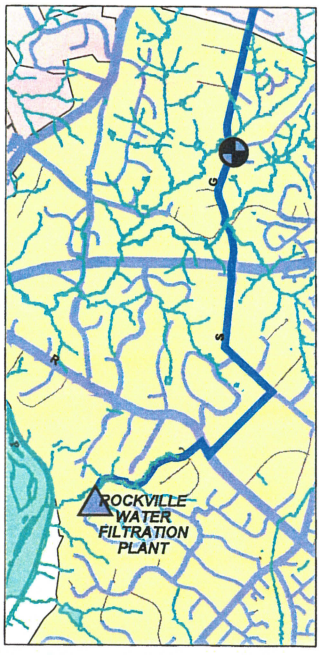
III. ROCKVILLE SANITARY DISTRICT

The City of Rockville owns and operates its own water supply system--separate from the WSSC community system–from source water to distribution. The City provides community water service to an area located outside the designated limits of the Washington Suburban Sanitary District (WSSD). This boundary does not completely coincide with the City's corporate limits. For the sake of convenience, this Plan refers to the City's service area as the Rockville Sanitary District (RSD).

A. Service Policies -- Approximately 90 percent of Rockville residents and businesses receive their water from the City's Filtration Plant and distribution system. The remaining 10 percent receive water from WSSC. Periodically, the city's boundary changes through property annexations. Historically, most annexations were driven by the property's location outside the WSSD. Rockville has a policy of providing water and sewer service only to properties located within the city limits. Accordingly, the City requires that properties located outside of both the city limits and the WSSD must annex into Rockville to receive public water and sewer. The City desires to maintain its own water supply system for two primary reasons: to control and manage development growth, and to provide less costly and more responsive water service. (See Figure 3-F7).

Figure 3-F7: Rockville Sanitary District and Water Distribution Systems





1 0 1 2 Miles

1 0 1 2 Miles

INSET A

MAP LEGEND

Rockville Water Mains
- 8"- or Smaller-Dia. Mains
- 10" to 15"-Dia. Mains
- 16"- to 24"-Dia. Mains

Rockville Water Storage Tanks

WSSC Water Mains
- 8"- or Smaller-Dia. Mains
- 10" to 15"-Dia. Mains
- 16"- to 42"-Dia. (CIP) Mains
- 48"- or Larger-Dia. (CIP) Mains

WSSC Water Storage Tanks

Roads

Lakes - Ponds

Streams

WSSC - Rockville Interconnections

City of Rockville Corporate Limits

Rockville Sanitary District (RSD)

WSSC Pressure Zones
- Montgomery County High Zone
- WSSD Main Zone

N W E S

Montgomery County, Maryland
2003 - 2012
Comprehensive Water Supply and Sewerage Systems Plan

Department of Environmental Protection
Montgomery County Maryland

Watershed Management Division
4/4/03 -- GIS Project File: o:\wwteam\cwsp\2002update\chapt3\3-f7=rsd_wtrsyst.apr

Water and Sewer Plan Recommendation
As in the 1999 - 2008 Water and Sewer Plan, this Plan recommends that the County, City, and WSSC begin discussions on aligning the city's corporate and sanitary district boundaries. This recommendation–which calls for discussions only--is made with the understanding that Rockville generally opposes an actual realignment of the city's corporate and/or sanitary boundaries.

B. Water Supply Source -- Rockville draws raw water from the Potomac River at an intake structure located on the east bank of the river at Sandy Landing Road on the C&O Canal, approximately 0.8 mile southeast of Swains Lock and five miles southwest of the city. Other than several interconnections with the WSSC water supply system (see Section IIE.3.), this functions as the City's only water supply source.

Rockville received its first Water Appropriation and Use Permit from the State of Maryland in 1958. The State issued this permit for a daily average of 5.5 MGD and a maximum daily withdrawal of 8.0 MGD. In May 2002, the State issued a Water Appropriation and Use Permit to Rockville increasing the daily average to 7.1 MGD and increasing the maximum daily withdrawal to 12.1 MGD.

C. Water Source Policies and Drought Management -- Because they share a common raw water source, the Potomac River, the RSD and WSSD also share some of the same policies and agreements affecting their use of the river, especially during drought events. The City of Rockville abides by the 1978 "Low Flow Allocation Agreement" when the restriction stage is declared in the Washington Metropolitan area as required by MDE's Water Management Administration. Rockville is accorded the same status as the WSSD under the Maryland Drought Monitoring and Response Plan. The City is also a signatory of the 1994 "Metropolitan Washington Water Supply Emergency Agreement" and the COG Drought Management Plan (See Section II.B.). Notwithstanding, the City has an agreement with WSSC which allows the City to request as much as 6 MGD of water from the WSSC system to respond to emergencies and to meet peak demands as indicated in the WSSC's 1994 Water Production Projections Report. Rockville's water supply system benefits from water supply releases from the Jennings Randolph Reservoir and Little Seneca Lake; the Washington Metropolitan Area water suppliers and the City have entered into discussions about Rockville's financial participation.

D. Water Treatment Facility -- The Rockville Water Filtration Plant has intake capacity of 14 MGD and a treatment capacity of 8 MGD. The treatment capacity will be increased to 14 MGD by 2004, but the plant may only withdraw up to 12.1 MGD under MDE's recently issued Water Appropriation and Use Permit. Currently, the Plant generally operates in a range of 4.0 to 6.4 MGD. (See Table 3-T11.)

Table 3-T11: RSD Water Treatment Facility

Facility Owner/Operating Agency Plant Location & Coordinates	**Water Source Treatment Type**	**Rated Plant Capacity Average Production Maximum Peak Flow Storage Capacity**	**Sludge and/or Filter Backwash**	**Status/Comments**
Rockville Filtration Plant City of Rockville Sandy Landing Road N433,000/E734,500	Potomac River sodium hydroxide, polyaluminum chloride, flocculation, filtration, chlorination, fluoridation	capacity: 8.0 MGD production: 4.7 MGD peak flow: 8.0 MGD storage: 12.2 MGD	land application	Expansion to 14 MGD capacity approved in 2002. Interconnections with WSSC allow the City to draw up to an additional 6 MGD in emergencies.

See Table 3-T3 for information on WSSC's filtration plants.

Since 1996, Rockville has designed and constructed multiple CIP projects to upgrade its 40-plus-year old Water Filtration Plant. Although the main objective of most of these projects has been to update the old plant, the City has also designed and implemented these projects to meet higher EPA standards and to meet

projected higher water demand, based on Rockville's Master Plan. These projects are addressed under Section III.E.5.

E. Water Supply Distribution and Storage System -- Rockville maintains its own water distribution system, supplying water service to residents, businesses and institutions within the RSD. The major elements of that system are as follows.

1. Pumping and Major Transmission Facilities -- Treated water leaving the Rockville Water Filtration Plant is pumped through 27,940 feet of 24-inch prestressed, steel cylinder, concrete pipe before it enters the distribution system at Glen Mill Road and Veirs Drive. The RSD has only one primary water service pressure zone, and therefore no intermediate pumping stations. The major distribution system consists of 24-inch, 20-inch, and 16-inch trunk mains. (See Figure 3-F7.)

2. Water Storage Facilities -- The City has four potable water storage facilities ranging in capacity form 0.2 to 8.0 million gallons with total storage capacity of 12.2 million gallons. The capacities of individual public potable storage facilities are indicated on Table 3-T12.

Table 3-T12: Water Storage Facilities - City of Rockville

Storage Facility	Capacity (Million Gallons)
Carr Avenue Tank	3.0
Filter Plant Clearwell	0.2
Hunting Hill Tank	8.0
Talbot Street Tank	1.0
Total	**12.2**

3. System Redundancy- Existing interconnections with the WSSC water system are listed on Table 3-T13. These interconnections serve primarily to increase the flow for available fire protection and to serve as an automatic emergency water source. The maximum allowable withdrawal from WSSC is 6 MGD based on the City's agreement with WSSC. The City's withdrawals from the WSSC system have generally averaged 1.5 MGD up to five times per year. In 1997 Rockville withdrew approximately 15 MG, during the course of 10 separate withdrawals, to meet peak demand. However, this trend is decreasing due to recent investments Rockville has made to replace the aging plant equipment and to increase the Plant's treatment capacity. In 2001, when the average annual withdrawal for the RSD was 0.005 MGD, the City withdrew less than 2 MG total from the WSSC, all of which was required due to five to six intermittent power failures at the treatment plant. One significant exception within the last five years occurred during 1998 when Rockville withdrew approximately 37 million gallons of water from WSSC over the course of one week while the City shut down the filtration plant in order to install new and upgraded equipment at the intake structure.

Table 3-T13: Existing Interconnections with WSSC - City of Rockville

Diameter Size (inches)	Location	Diameter Size (inches)	Location
12	Redland Rd. and Piccard Dr.	8	Stratton Dr. and Dunster La.
8	College Pkwy. north of Nelson St.	24	Glen Mill Rd. and Circle Dr.
8	Wintergreen Terr. and Larkspur Terr.	24	Glen Mill Road and Lakewood Drive
12	Southlawn La. south of E. Gude Dr.	24	Glen Mill Rd. and Lloyd Rd.
16	Rockville Pk. and Rollins Ave.	24	Glen Mill Rd. and Pheasant Drive
12	Montrose Rd. and Farm Haven Dr.	24	Glen Mill Rd. and Valley Drive
6	Canterbury Way and WSSD Boundary	12	Shady Grove Rd. and Darnestown Rd.

4. Projected Water Demand -- The average daily production for 1997 was 4.97 MGD with a maximum day of 8.0 MGD, which is Rockville's Filtration Plant capacity limit. The average daily production for 2001 was 4.66 MGD with a maximum day of 8.0 MGD.

Table 3-T14 shows the following information: population projections for that part of Rockville outside the WSSD (or within the RSD), projected water demands, and planned water plant capacity. The average day demand projection for 2015 is 7.1 MGD with an ultimate average day demand of 8.2 MGD, which exceeds the current capacity of the Rockville Filtration Plant of 8.0 MGD. The maximum daily demands are projected to be 12.0 MGD in 2015 and 14.0 MGD ultimate, both of which exceed the Plant's existing capacity.

Table 3-T14: Projected Water Supply Demands and Planned Capacity City of Rockville

Calendar Year	Population (RSD)*	Projected Demand (MGD)		Planned Capacity (MGD) Daily Maximum
		Daily Average	Maximum Daily	
2005		7.0	8.2	14.0
2010		7.1	8.2	14.0
2015		7.1	11.9	14.0

Source: Water Demand Forecast, Rockville Dept. of Public Works, April 2000
*Note: This data for the RSD only; does not include properties served by WSSC; population data pending from Rockville.

5. Projected Water Supply System Needs -- Beginning in 1995 Rockville has designed and constructed multiple CIP projects to upgrade its Water Filtration Plant. While the main objective of most of these projects has been to update the old plant, the City has also designed and implemented projects needed to meet higher EPA standards and to meet higher projected water demand (based on the Master Plan). The first major Water Plant project, which was completed in 1996, was the addition of the filter press. Other projects that have been completed recently include Rehabilitation of the Intake Structure (1999), Clarifier Upgrade (2000), and Filter Upgrade (2003).

Two projects remain to be implemented: the Water Plant Pump Upgrade and the Glen Mill Pump Station. These projects are both under design, with construction planned to begin in 2003. MDE has approved over $8 million in three separate loans to Rockville to fund some of the above listed projects.

The City's Department of Public Works is managing two design projects, which will improve the City's water distribution system. One of these projects is a pump upgrade, located at the water treatment plant. The other project is a new water pumping station, rated at 1.4-MGD, located at Glen Mill Road adjacent to Sandringham Court in Potomac. These projects are planned for construction in 2003 and will be operational in 2004. The City is also considering a second water pumping station located within the Fallsgrove community. The need for this second pump station is under review.

Projected water treatment and area distribution system projects intended to address anticipated demands in the RSD include:

- Refurbishing all three plant pumps to attain 14.0 MGD production
- Adding a new pumps, motor, controls, piping, etc. capable of producing 14.0 MGD
- Increasing filter capacity to provide continuous production of 14.0 MGD
- Constructing a total of 18,430 feet of new water mains, ranging from 8 inches to 12 inches, by 2009

TABLE 3-T15: Immediate, 5-, and 10-Year Priorities for Water Supply Development City of Rockville

Fiscal Year -- Project Number	Location	Description	Estimated Costs*			Project Status - Construction Start	
			Total	Federal and/or State	Local	Immediate Priority Projects	Five and Ten Year Period Projects
Before 2004	Sandy Landing Road -- Glen Mill Road	Treatment Plant Improvements	$4,000,000	$4,000,000	none	Replace Pumps & Construct new Pump Station	none
Before 2009	Varies	New Water Mains (18,430 feet)	$3,609,200	none	$3,609,200	Adclare Rd. , N. Horners Lane, & Beall Ave/Park Rd	Jefferson St. & Lewis Ave.
Before 2010	Varies	Clean & Line Water Mains (8,930 feet)	$376,000	none	$376,000	Nelson St & Mannakee St.	Crawford Dr
NA	Fallsgrove Pump Station	Northwest Booster Pump Station	$779,000	none	$779,000	none	none

* Based on Costs from Adopted 2003-2008 CIP

6. Financing Water Systems – Information on the City's water system financing methods is included in Chapter 1, Section IV.B.

IV. TOWN OF POOLESVILLE

The Town of Poolesville, located in western Montgomery County (see Figure 3-F1), has operated its own community water supply, storage, and distribution system since 1964. It is the only community water supply system in the County which relies on groundwater for its source water supply. Poolesville's water supply system serves only residences, businesses and institutions within the town, forming a sanitary district concurrent with the Town's corporate limits and exclusive from the WSSD.

A. Water Supply Source -- The Town presently has nine municipal groundwater wells in operation, which have a combined total average constant sustainable yield per day of 734 gpm, or 1,057,000 gpd (assumes 24 hours pumping).

The Town's well #1, with an average constant sustainable yield of 30 gpm (43,000 gpd), developed turbidity and fecal coliform contamination problems in 1999. The Town unsuccessfully attempted to rehabilitate the well and subsequently abandoned it in May 2000. In June 2000, the Town drilled a replacement well. Its average yield was estimated to be 35 gpm (50,000 gpd). Unfortunately, this well also has similar water quality problems as the original well #1. At this time, the Town is not planning to use either of these wells.

The Town's well #2, with an average constant sustainable yield of 100 gpm (144,000 gpd) has shown signs of possibly being under the direct influence of bacterial contamination. The Town only uses this well when testing shows no presence of coliform.

Water quality in the Town's eight remaining wells is good and conforms with current EPA drinking water standards. The Town currently withdraws groundwater from the New Oxford Formation aquifer and has four watersheds within its corporate boundaries: Horsepen Branch, Broad Run, Dry Seneca Creek, and Russell Branch. In December 2002, MDE issued the Town new Water Appropriation and Use (WAU) permits for the Horsepen Branch, Dry Seneca Creek, and Russell Branch watersheds, which allow the Town to withdraw a total daily average of 550,000 GPD (382 GPM) on a yearly basis and a daily average of 770,000 GPD (535 GPM) for the month of maximum use. Since the Town does not currently withdraw water from the Broad Run watershed, no WAU permit is currently issued for this watershed.

According to MDE, on a yearly basis the Town has a total daily average of 651,000 GPD (452 GPM) of groundwater theoretically available within the corporate boundaries. The permitted groundwater yield for both the Horsepen and Russell Branch watersheds are essentially "tapped out." The Dry Seneca Creek and Broad Run watersheds have an additional 17,000 GPD (12 GPM) and 140,000 GPD (97 GPM) of available groundwater supply on a daily average basis, respectively. According to MDE, this theoretical "untapped" available groundwater supply would support approximately 1,500 additional persons.

The Town wells and available groundwater supply per watershed are described on Tables 3-T16 and 3-T17, respectively, and are mapped in Figure 3-F8.

Table 3-T16: Available Groundwater Supply By Watershed – Town of Poolesville

Watershed - Community System Wells	Area (Acres)	Theoretically Available Groundwater (GPD)	Ave. Daily Allocation (GPD)	Max. Monthly Average Allo-cation (GPD)	Potential Well Yields (GPD)	Remaining Available Groundwater (GPD)
Horsepen Branch Wells 2,4,6, & 8	588	149,000	293,000	410,000	468,000	0
Broad Run (No Wells)	551	140,000	0	0	0	140,000
Dry Seneca Creek Wells 3 & 5	973	247,000	142,000	199,000	230,000	17,000
Russell Branch Wells 7, 9, & 10	450	115,000	115,000	161,000	359,000	0
Totals	2,562	651,000	550,000	770,000	1,057,000	157,000

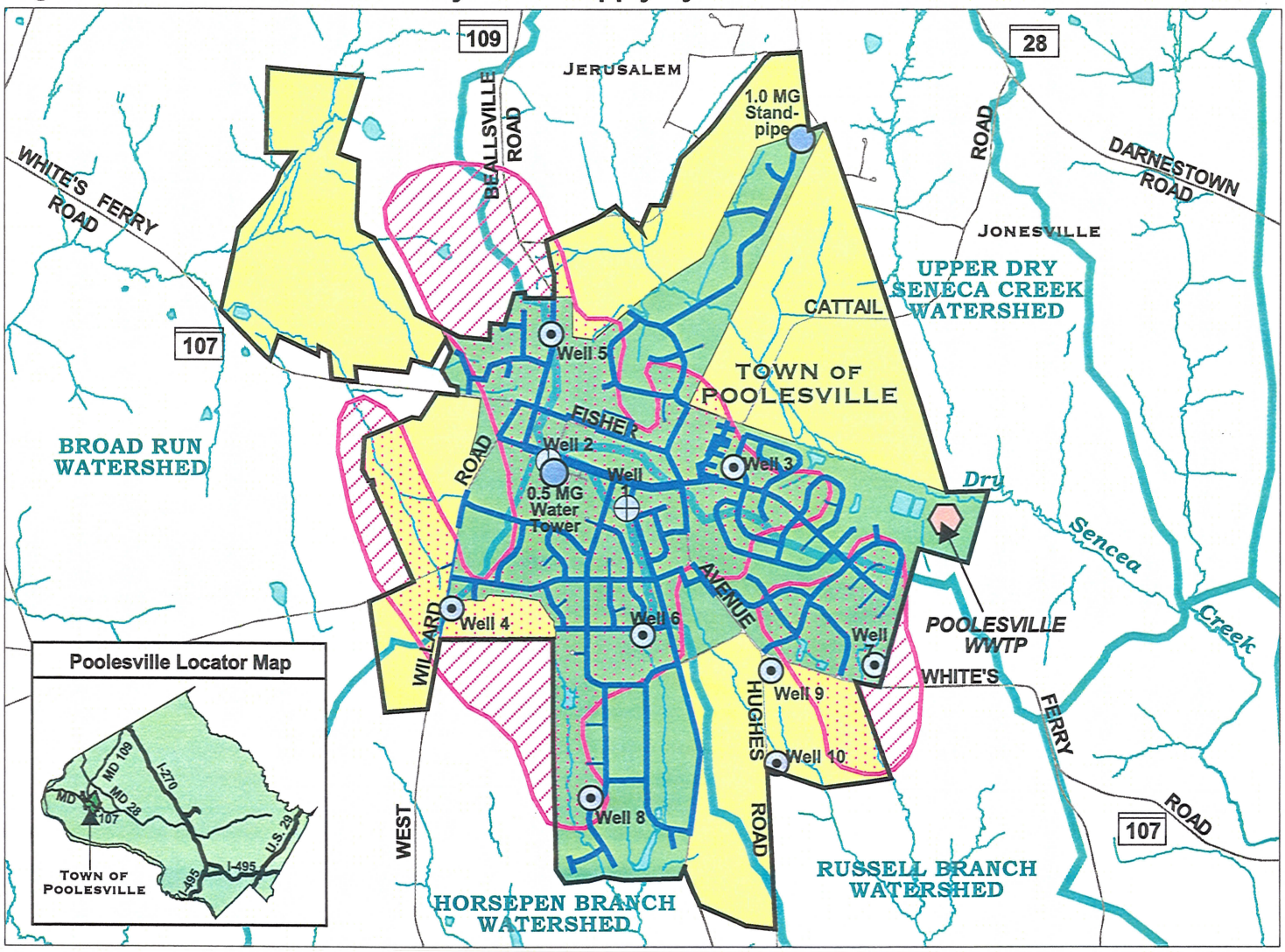
Table 3-T17: Inventory of Existing Community System Wells -- Town of Poolesville

MDE Appropriation Permit	Well*** Name or Number	Aquifer	Coordinate Location	Depth (Feet)	Diameter (Inches)	Ave. Constant Sustainable Yield (gpm) *	Potential Daily Yield (gpd) **	Water Quality
#M01970G007(10)	2	New Oxford Formation	N477,190 E682,120	453	6	(100)****	(144,000)****	****
#M01970G107(01)	3		N477,190 E685,030	285	6	60	86,400	Good
#M01970G007(10)	4		N477,000 E680,000	600	6.5	35	50,400	Good
#M01970G107(01)	5		N479,350 E681,850	500	6	100	144,000	Good
#M01970G007(10)	6		N474,000 E684,000	500	6	130	187,200	Good
#M01970G207(01)	7		N543,500 E687,500	700	8	50	72,000	Good
#M01970G007(10)	8		N472,000 E637,500	500	8	60	86,400	Good
#M01970G207(01)	9		N534,100 E1,198,275	800	8	124	179,600	Good
#M01770G207(01)	10		N532,950 E1,198,360	762	8	75	108,000	Good
TOTAL						634	1,057,000	

* Based on well yield data and pump tests performed by the Town.
** Assumes 24 hours of pumping per day.
*** The Town removed Well #1 from service due to turbidity and fecal coliform contamination.
**** The Town uses Well #2 only intermittently, when in dry weather and when tests show no evidence of coliform contamination.

Source: Town of Poolesville.

Figure 3-F8: Pooleville Community Water Supply Systems



0.5 0 0.5 1 1.5 2 2.5 3 Miles

N
W E
S

MAP LEGEND

Poolesville Water Supply Systems

- Water Storage Tanks

Community Water System Wells

- 6 Active
- 2 Intermittent
- 1 Inactive

Water Mains

- 2" - 4"-Diameter Mains
- 6" - 10"-Diameter Mains
- 12" - 16"-Diameter Mains

Wellhead Protection Areas*

- Areas Within Poolesville
- Areas Outside Poolesville (Outside the Town's Control)

* For Poolesville Wells 1 - 8 only; protection areas for new wells have not be determined yet.

Community Water Service Areas

- Existing/Planned Service
- No Planned Service
- Town of Poolesville - Corporate Limits
- Poolesville Wastewater Treatment Plant
- Roads
- Watersheds
- Ponds - Lakes
- Streams

Montgomery County, Maryland
2003 - 2012
Comprehensive Water Supply and Sewerage Systems Plan

Watershed Management Division
5/27/03 -- GIS Project File: o:\wwteam\cwsp\2002update\ch3\poolesville_water.apr

The Town has experienced problems with reduced well yield during dry periods. Historically, the Town's average well yields have been reduced by as much as 35 percent during drought conditions, which can reduce the available water supply to as low as 280 gpm or 406,000 gpd. During the summers of 1993, 1995, 1999, and 2002, the Town enacted mandatory water restrictions to ensure adequate water supply to meet basic needs. Water restrictions imposed by the State also affected the Town during the 2002 drought.

B. Source Water Protection Programs -- When water is pumped from community wells, the groundwater level in the wells' vicinity draws down and forms cones of depression. The wellfield, or circle of influence of a well, is the outer perimeter of this cone of depression. If wells are placed too close together so that their wellfields overlap, interference occurs such that, the capacity rate of water pumped decreases for each well. Future well sites, for which the Town is currently exploring locations, may have to be located outside of the town's corporate limits so that wellfield areas do not overlap.

The Town is currently developing a Wellhead Protection Program to protect its groundwater supply from contamination. In January 1995, the State used a combination of hydrogeologic models and fracture trace analyses to estimate the wellhead protection boundaries for the Town's wells. The limits of the Town's wellhead protection area are depicted in Figure 3-F8 and extend outside of the town's corporate limits.

The U.S. EPA has designated the Town's groundwater supply as part of a Sole Source Aquifer (see Section V.B.3.).

C. Water Distribution System -- The Town of Poolesville has one pressure zone maintained by eight well pumps and two storage facilities. These two water storage facilities have a combined capacity of 1.5 million gallons. The storage facilities provide the Town with several days capacity to respond to unexpected and non-catastrophic events such as well pump malfunction or water line breaks (see Figure 3-T8). The recently constructed one million gallon ground level standpipe storage tank has a booster pump station with a capacity of 1500 gpm. Under normal operating conditions, the standpipe tank operates via gravity. The Town has approximately 110,000 feet of water mains ranging in diameter from 1" to 16".

D. System Redundancy -- The Town of Poolesville currently has no immediate means of obtaining additional water supply other than the Town's existing wells. The two closest potential connection points with the WSSC water system are located in Darnestown along Route 28 and south of Darnestown along River Road and are a considerable distance (approximately seven and twelve miles, respectively) from Poolesville. The Potomac River, a possible source of surface water, is located approximately 4 miles from the Town. The Town has no plan at this time either to develop a treated surface water supply or to connect to the WSSC system.

E. Projected Growth and Water System Demand -- Table 3-T18 summarizes the Town of Poolesville's past and projected population along with projected water supply demands and planned capacity for the town. The Town's current six-year Master Plan, published in March 1996, calls for an ultimate population of 7,500 but establishes a firm growth limit of 5,500 for the life of the Plan. 2000 census data indicated that the town's population was 5,151. Population projections for the year 2005 and beyond are expected to be revisited when the Town updates its Master Plan in 2003.

Table 3-T18: Projected Water Supply Demands and Planned Capacity --Town of Poolesville						
Design Year	Population			GPCD (gallons)	CAPACITY (MGD)	
	Total	Served	Unserved		Average	Peak Monthly Demand
2000	5,151	5,050	50	94	0.480	0.720
2005	5,500	5,450	50	100	0.550	0.770
2010	5,500	5,450	50	100	0.550	0.770
2015	5,500	5,450	50	100	0.550	0.770
2020	5,500	5,450	50	100	0.550	0.770

- Gallons Per Capita Per Day (GPCD) for the year 2000 based on actual data. Future GPCD projections estimated by the Town.
- For planning purposes, the Town estimates the peak monthly demand to be 1.5 times the average monthly demand.
- The Town may reconsider their population projections for the year 2005 and beyond when they update their Master Plan in 2002.
- Unserved population utilizes private, individual wells.

To ensure that sufficient water supply exists to meet peak summer demands during drought conditions, the Town has estimated that it needs a total average constant sustainable water supply capacity of 770 gpm (1,110,000 gpd) or an additional 335 gpm (485,000 gpd) to support its current population. To support a population increase to 5,500 persons, the average water supply capacity will need to increase to 885 gpm (1,274,400 gpd) or an additional 450 gpm.

F. Projected Water Supply System Facility Needs – To provide system redundancy, the Town has aggressively pursed new groundwater supply sources. The Town's consultants identified approximately 12 to 15 test wells through fracture trace analyses and field reconnaissance. During the Spring of 2001, the Town drilled three of six possible test wells (all located within the Town's corporate boundary), four of which appeared promising as potential production wells; they had an estimated combined yield of approximately 439 gpm. The Town conducted pump and water quality tests during the Summer of 2001 and placed these two new wells in service in the late Summer/early Fall of 2001 (no. 9 and no. 10; see Table 3-T17), and plan to place the other two wells in service in the Fall of 2003 (no. 11) and in 2005 (no. 12).

The 1.5 million gallon storage capacity currently provided in the Town is sufficient to serve the ultimate population of 7,500. While no chronic water pressure problems exist within the Town's distribution system, there are several areas within the distribution system that could benefit from additional water line extensions and looping. Potential future water distribution projects are included on Table 3-T19.

TABLE 3-T19: Immediate, 5-, and 10-Year Priorities for Water Supply Development Town of Poolesville							
Fiscal Year	Location	Description	Estimated Costs*			Project Status - Construction Start	
			Total	Federal and/or State	Local	Immediate Priority Projects	Five and Ten Year Period Projects
2003	To be determined	Well #11 & well House	$450,000		$450,000	X	
2005	To be determined	Well #12 & well House	$450,000		$450,000	X	
2006*	West Willard	Water main	$171,000		$171,000		X
2006*	Fisher Avenue	Water main	$135,000		$135,000		X
2006*	West Willard	Water main	$116,000		$116,000		X

* This water main extension project could be completed sooner than projected if the extension is needed to place a new well into service

G. Financing Water Systems – – Information on the Town's water system financing methods is included in Chapter 1, Section IV.C.

V. INDIVIDUAL WATER SUPPLY SYSTEMS AND RURAL SANITATION

In the more rural, less-densely populated parts of Montgomery County, residents, businesses and institutions depend primarily on wells supplied by groundwater for their water supply. Approximately 80,000 county residents rely on groundwater for their only source of water supply. The areas dependent on groundwater wells form an irregular crescent starting in the southwestern part of the county, sweeping around to the west, then north of Clarksburg and around Damascus, then south and east along the Patuxent River watershed (see Figure 3-F10). The county has approximately 50,000 individual wells in use. Although most wells are located in areas not served by the community water supply systems, older wells may be found throughout the county, including areas served by community systems.

Of the wells within the county, only Poolesville's municipal wells are part of a community water supply system. This Plan refers to private or non-municipal wells as "individual water supply systems," consistent with State law. Some larger individual water supply systems are referred to as "multi-use systems." (See Section V.C.).

A. Groundwater Supply Geologic Conditions -- Most of Montgomery County is located in the Piedmont physiographic province. A thin section of Coastal Plain sediments overlays the crystalline rocks of the Piedmont formations in the area east of U.S. Route 29. The crystalline rocks of the Piedmont are chiefly phyllites and schist. In the southwestern portion of the county, red and gray siltstone and sandstone sedimentary formations overlay the crystalline rock. Most of the area underlaid by schists or Coastal Plain sediments have already been developed on the WSSC or Rockville public water systems. Remaining areas in these geologic units are within the proposed water service envelope or are planned for relatively low density development.

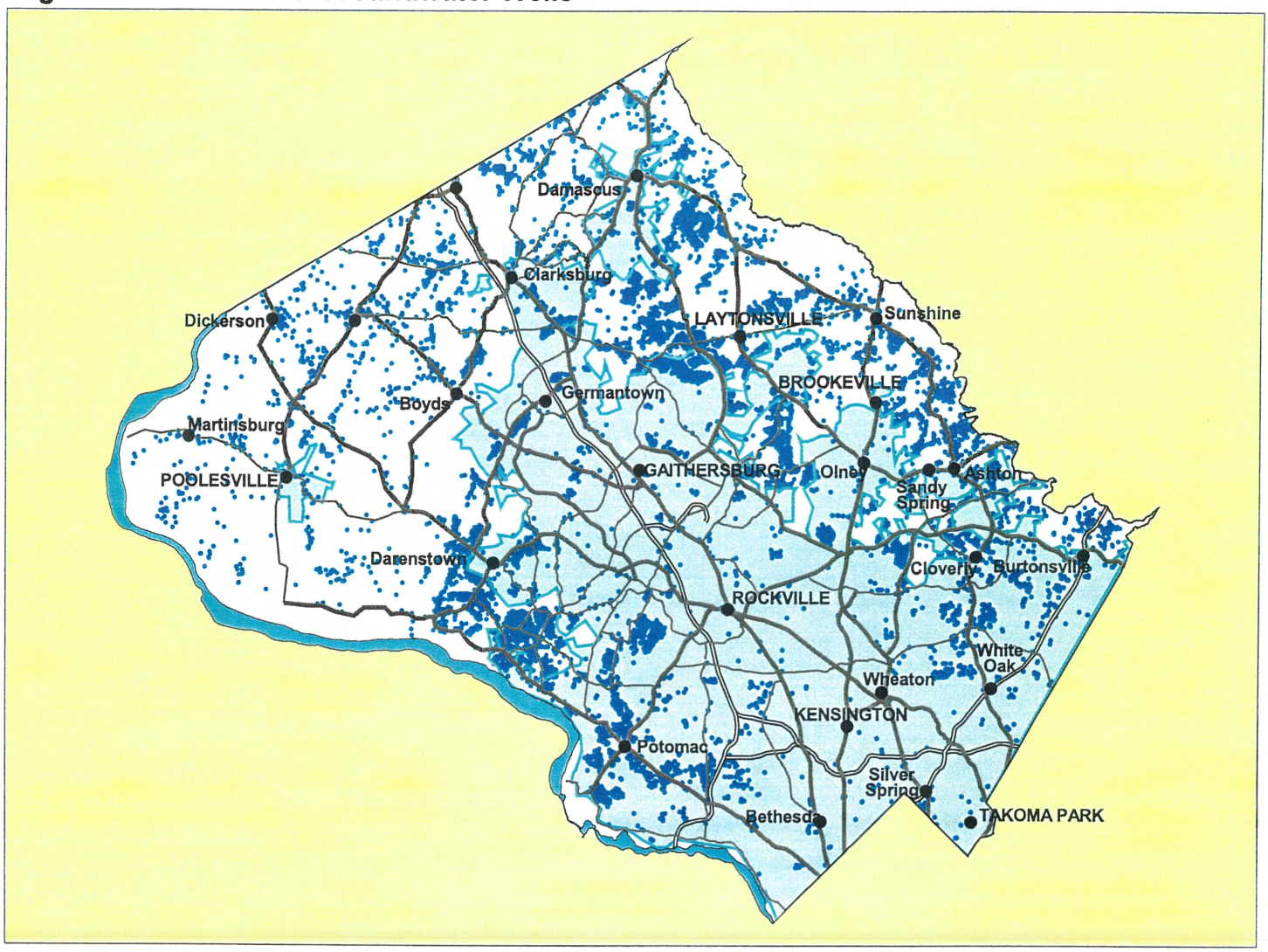
All of the bedrock in the county is fractured to some extent, some formations more than others. Wells that intercept fractures usually provide the best groundwater yields. However, fractures do not normally extend great distances, and there is little or no interconnection between adjoining basins or sub-basins. Drainage divides for surface streams also define the boundaries for subsurface water movement. The flow in streams following the dissipation of storm flows is known as base flow and represents the gradual discharge of groundwater to the surface.

The Phyllite rock underlying the western and northwestern portions of the county have moderately shallow soils with bedrock outcrops, particularly in stream valleys. Although these areas have some of the lowest well yields of any area of the county, these yields are generally adequate for individual dwellings and businesses. Water quality is considered good; it seldom requires treatment for use, and there are no known areas of widespread pollution though localized pollution is a problem in some areas.

The southwestern portion of the county is characterized by sedimentary deposits of shale, sandstone and siltstone, which provide the source of water for the Town of Poolesville. The Town uses all the water withdrawn from the sedimentary area for potable use. These sedimentary deposits, along with the phyllite areas, are not considered good aquifers from the standpoint of yield. Water in the sedimentary rock strata is chiefly found in fractures and crevices. Since the soil and overburden above the bedrock is thin, it offers little opportunity for groundwater storage. The yield of wells in this area can decline dramatically during extended drought periods, as has been experienced by the town of Poolesville. During normal rainfall periods, well yields remain constant and adequate. To counter low yields during periods of drought, additional wells may be required.

The water in the sedimentary area tends to be hard and mildly alkaline. Occasionally iron and/or manganese needs to be removed for aesthetic reasons. The water quality in this area is similar to water quality in other sedimentary areas of Maryland and Virginia that have primarily rural agricultural land uses and is generally considered to be good.

Figure 3-F9: Permitted Groundwater Wells



5 0 5 10 15 20 25 Miles

N
W E
S

MAP LEGEND
- Permitted Groundwater Wells*
- Communities

Major Roads
- County Roads
- State Roads and Highways
- US & Interstate Highways

General Community Water Service Envelope

* As verified by DPS well permit records.

Source: Mont.Co. Groundwater Protection Strategy (DEP)

Montgomery County, Maryland
2003-2012
Comprehensive Water Supply and Sewerage Systems Plan

Department of Environmental Protection
Montgomery County Maryland

Watershed Management Division
5/26/04 -- GIS Project File: o:\wwteam\cwsp\2002update\ch3\3-f9-groundwater_wells.apr

B. Groundwater Regulations and Protection Programs -- The following programs regulate the establishment and use of groundwater wells and protect the county's groundwater resources.

1. Well Permitting -- The County's Department of Permitting Services (DPS), Well and Septic Section, is responsible for the administration and enforcement of County and State laws and regulations governing on-site, individual water supply systems. This authority is delegated from the State's Department of the Environment (MDE). Relevant regulations are included in COMAR 26.03.01, 26.03.05, and 26.04.02 - .04,and in County Executive Regulation 28-93AM, "On-Site Water Systems and On-Site Sewage Disposal Systems in Montgomery County."

DPS accomplishes these responsibilities by reviewing preliminary plans and record plats for properties served by on-site systems; issuing permits for, and inspecting, the construction of new and replacement wells; sampling water supplies for potability; and by responding to complaints about on-site systems. New wells for potable uses are normally sampled for nitrates, coliform bacteria, and turbidity. On-going well monitoring is done when some subsequent licensure or approval is required, such as child care licenses, group or nursing homes, food service facilities, or swimming pools. There are no requirements for ongoing monitoring of wells used solely for single family residences. A typical residential demand is often calculated at 500 gpd per average single family residence for septic system design purposes. COMAR regulations require a well yield of at least one gallon per minute and at least 500 gallons of water to be available during one two-hour period each day.

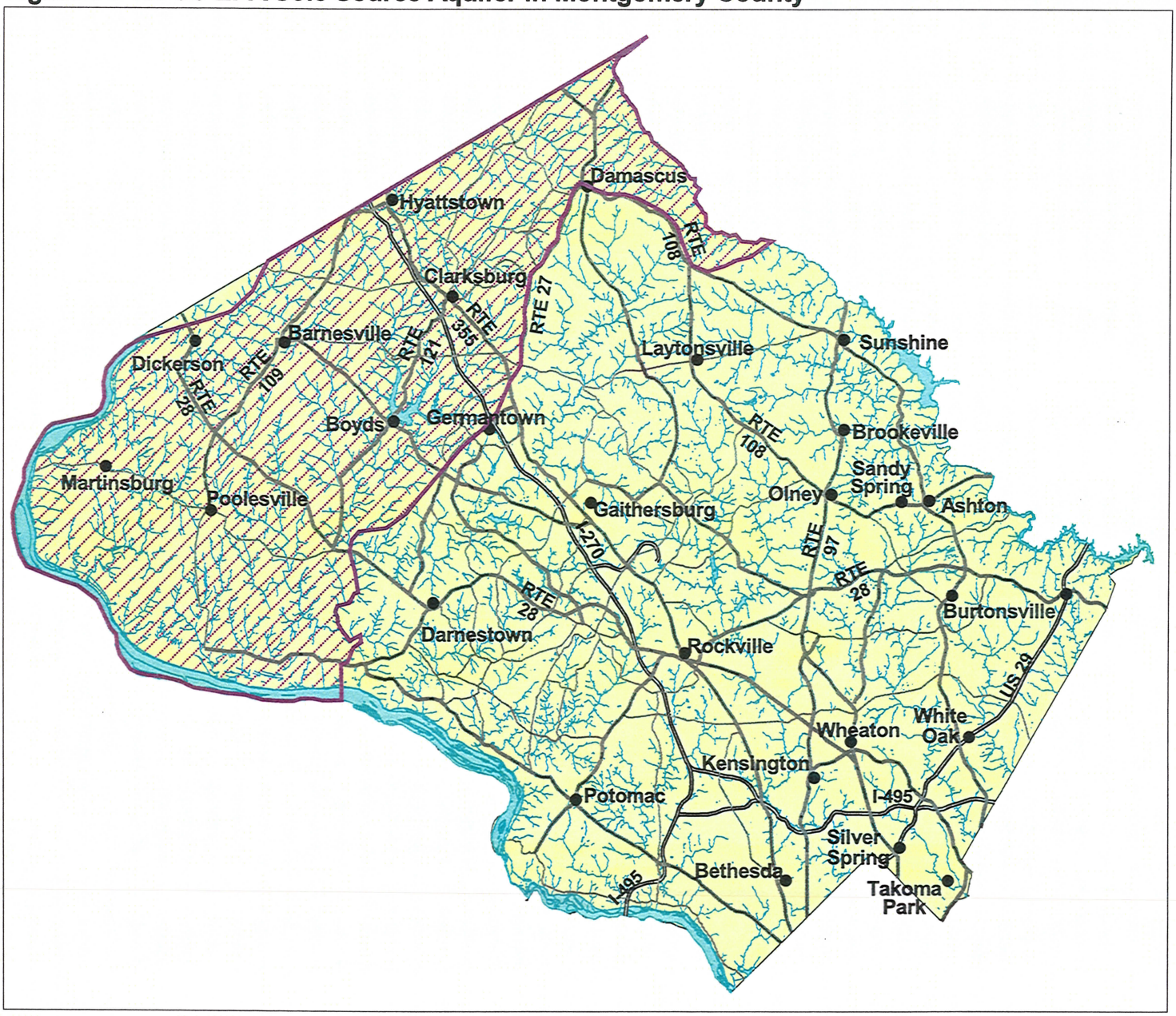
MDE maintains a permitting authority for commercial, institutional, and residential subdivision projects though its Water Appropriation and Use permit. This permit is also required for wells for non-potable uses such as irrigation or commercial uses. As the County authority responsible for water and sewer service planning, DEP reviews and signs off on these permits to ensure that they comply with the Water and Sewer Plan.

2. Groundwater Protection Strategy -- With approximately 80,000 of its residents dependent on groundwater for their potable water supply, the County, through the Department of Environmental Protection (DEP), has recognized the need to ensure the quality of its groundwater resources. In 2001,the County Executive through DEP initiated a program intended to address the County's groundwater protection needs, resulting in the November 2001 *Groundwater Protection Strategy* (GWPS), the first major step in achieving this goal. The GWPS emphasizes a need to establish a baseline existing condition for the condition of the county's groundwater resources, and to establish a long-term groundwater monitoring program. The GWPS also recognizes the need to establish appropriate policies, guidelines, and regulations to minimize future contamination, and to ensure that future development will comply with environmental laws and regulations affecting groundwater quality. In implementing the first steps of this strategy, DEP has conducted a limited survey of available well and septic permit records, noting the location of each. The well permits also provided information on the depth to the water table throughout much of the county. DEP is also instituting a county-wide network of fifty sampling wells to establish a baseline groundwater condition and then to serve as future monitoring sites.

3. Sole Source Aquifer -- The Sole Source Aquifer Program, established under Section 1424(e) of the Federal Safe Drinking Water Act of 1974, authorizes the Administrator of the U.S. Environmental Protection Agency (EPA) to designate aquifers as the "sole or principal" source of drinking water for an area. The program provides for EPA review of Federally-financed assisted projects planned for the area and to determine their potential for contaminating the aquifer so as to create a significant hazard to public health. EPA may approve, disapprove, or approve conditionally with modification a project using Federal funds. In August 27, 1980, EPA announced the designation of parts of Montgomery County as part of the Maryland Piedmont Sole Source Aquifer. The sole source aquifer within Montgomery County is shown in Figure 3-F10.

C. Ground Water and Well Problem Areas -- Although DPS does not currently maintain a comprehensive database of well yields and contamination problems throughout the county, that agency has provided information concerning groundwater problem areas based on staff experience as identified in Table 3-T20 and are identified on Figure 3-F11.

Figure 3-F10: US EPA Sole Source Aquifer in Montgomery County



5 0 5 10 15 20 Miles

MAP LEGEND
- Localities

Major Roads
- County Roads
- State Roads & Highways
- US & Interstate Highways
- Maryland Piedmont Sole Source Aquifer*
- Streams - Rivers
- Major Rivers - Lakes

N W E S

Montgomery County, Maryland
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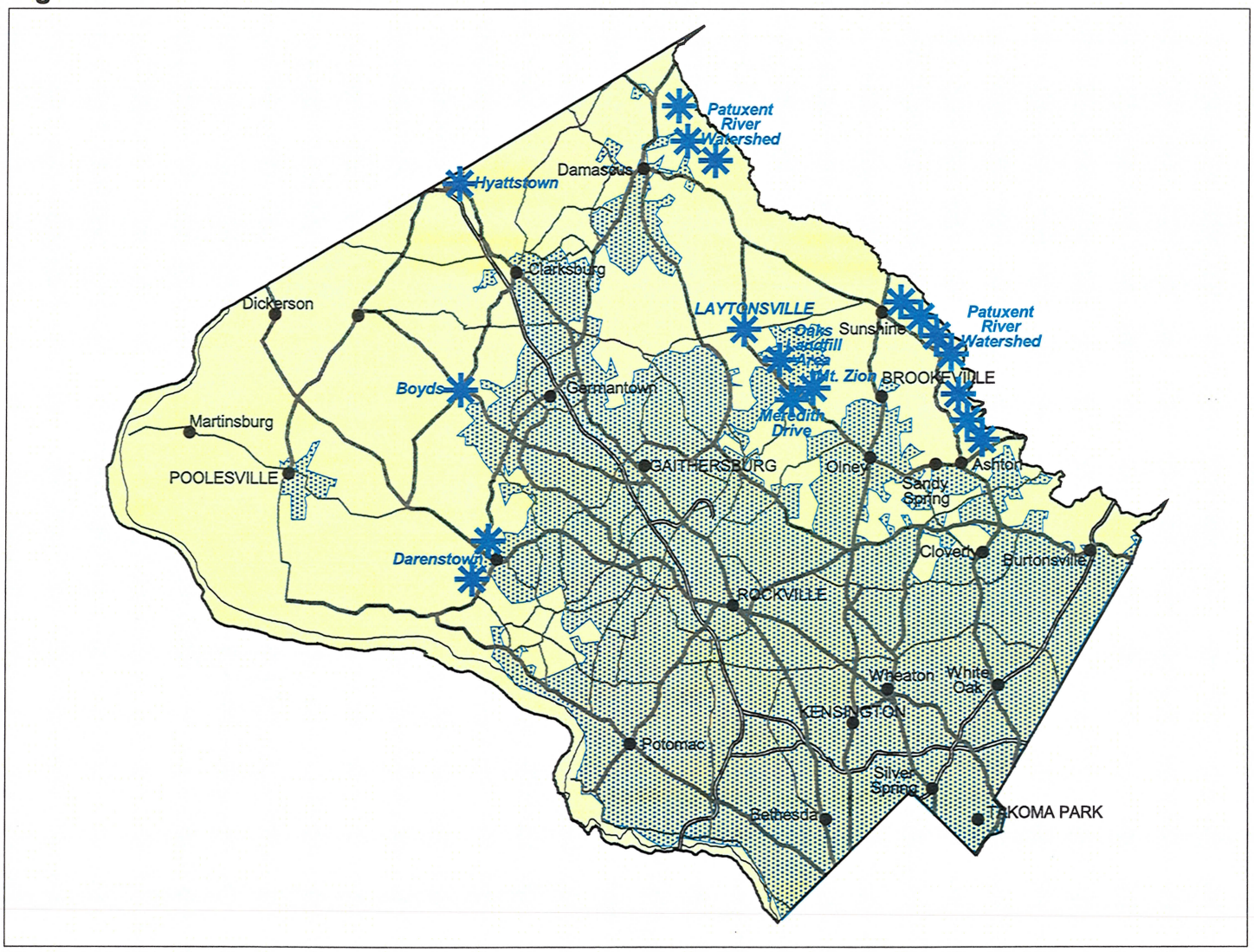
Department of Environmental Protection
Montgomery County Maryland

* Source: US EPA -- Federal Register 2/6/98
(Adapted by DEP for MC:MAPS)

Watershed Management Division
4/15/03 -- GIS Project File: o\:wwteam\cwsp 2002update\chpt3\3-f10=epaaquifer.apr

Figure 3-F11: Well Problem Areas



MAP LEGEND

- ✱ ***Well Problem Areas****
- • INCORPORATED COMMUNITIES
- • Unincorporated Communities

Major Roads

- County Roads
- State Roads and Highways
- US & Interstate Highways
- General Community Water Service Envelope

* For additional information, refer to Table 3-T20
Source: DPS Well and Septic Section

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Table 3-T20: Groundwater and Well Problem Areas

Location	Problem	Potential Solutions	Actions Taken
Oaks Landfill Vicinity -- near Mt. Zion, between Olney and Laytonsville	▪ contaminated wells; DEP's groundwater monitoring confirmed leakage from the northwest quadrant of the Oaks Sanitary Landfill as the contamination source ▪ Mt. Zion: old, hand-dug wells out of date with State and County regulations	▪ bottled water ▪ community water service	The County has extended community water service to properties in the vicinity of the landfill, as per the County's agreement with the local community. Community service replaced bottled water service, also provided by the County.
Meredith Drive, Mt. Zion - east of Muncaster Road	contaminated wells (hydrocarbons)	▪ community water service ▪ individual GAC filters	As part of the extension of service to the Oaks Landfill vicinity (see above), the County was also able to provide community water service to this street.
Town of Laytonsville	polluted aquifer (hydrocarbons and nitrates)	▪ community water service ▪ individual GAC filters ▪ handle old wells properly	The County and WSSC are investigating the extension of community water service to the town and nearby properties. (See Section II.F.2.b.iii.)
Town of Boyds	polluted aquifer	▪ community water service ▪ individual GAC filers	
Hyattstown	contaminated wells	▪ community water service ▪ appropriate on-site treatment	
Patuxent River Watershed ▪ northeast of Damascus ▪ Between Routes 108 and 97	low well yields		DPS requires pretesting of wells for adequate yields in these areas. Some areas have limited access to community water service.
Western & Southern Darnestown	elevated nitrate levels		DPS has required advanced treatment on larger, multi-use septic systems in this area. Properties near Routes 28 and 112 have access to community water service.
Jerusalem Terrace	polluted aquifer	community water service	

CAG: granular activated carbon

D. Multi-Use Water Supply Systems -- As described in Chapter 1, multi-use water supply systems are defined as individual, on-site water systems with a capacity of 1,500 or more gallons per day. Because of their greater potential for environmental impacts, these systems require approval in the Water and Sewer Plan. These facilities are generally large-capacity well water systems, although some facilities use more advanced treatment systems. Almost all depend on groundwater for their water supply. DEP coordinates the Water and Sewer Plan amendments for these systems with DPS. Appendix B includes a listing of the multi-use water supply facilities in Montgomery County approved in this Plan.

VI. REFERENCES

"Report on Pitometer Water Distribution Study," by Pitometer Associates, City of Rockville, 1994.

"Town of Poolesville Master Plan", March 1996.

"Maryland Model Wellhead Protection Ordinance", Maryland Department of the Environment, Water Management Administration, Public Drinking Water Program, February 1997.

"2001 Water Production Projections", WSSC.

"A Comprehensive Long-Range Macro-Level Analysis of the WSSC Water Supply And Wastewater Systems", WSSC, Updated December 1990.

"Facility Planning and Environmental Assessment Manual", WSSC, June 1992.

WSSC, Fiscal Year 2003 CIP, Water and Sewerage Projects.

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"Potomac River Source Water Assessments for Maryland Plants, Washington Suburban Sanitary Commission Potomac Water Filtration Plant," Becker and O'Melia, LLC for MDE and WSSC, May 2002